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THE IRON AGE

New York, January 2, 1919

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Facing Readjustment

WITH "force to the utmost, force without stint or limit" as the Nation's war-cry in 1918, American steel blasted a way through and saved the world.

Every energy and every resource were bent to the one purpose. Not for a day until peace came was any captain of American industry left in doubt as to his line of action. All were as soldiers under orders.

In a day when it had expected that war would still be its whole business, the Nation suddenly faced peace and now enters a year beset with problems. There was leadership in war, but industry must find its own way through the readjustments of peace.

An epochal year is ahead. Something more than optimism must be brought to tasks that will be greater even than those of war. American employers must recognize that a new day has come to labor. Something higher than "the law of the pack" must govern our trade rivalries with those peoples who fought with us to save the world's liberties.

Courage, insight and the will to win have marked every advance of American business, and the same invincible spirit will be equal to every situation of the coming year.

In that confidence, THE IRON AGE pledges its utmost to the great industries with whose leaders it has shared the toils and triumphs of the marches of many years.

THE IRON AGE

New York, January 2, 1919

ESTABLISHED 1855 VOL. 103: No. 1

A Year of Prodigious War Effort

Checked by Many Obstacles Throughout and Suddenly Faced with Cessation of Demand at the Close—Return of an Open Market

FOR 315 days the year 1918 in iron and steel was marked by the concentration of every resource upon the task to which the Nation gave itself unreservedly when in April, 1917, it entered the war. Fifty days before the year ended came news of an armistice whose terms made Germany powerless, and from Nov. 11 the industry was absorbed in plans of readjustment to the requirements of peace. The suddenness of the German collapse was fairly astounding. It found the United States at the height of its military power and every plan of the great war machine that had been built up at Washington looked to the continuance of the fighting well into 1919.

With all its history of remarkable transitions in a single year from intensive production and high prices to a condition of low demand and declining prices, or the reverse, the steel trade offers no such contrast as that between the opening and the close of 1918.

Decreasing Profits but Stationary Steel Prices

There was also always overhanging the conferences held at Washington between the steel industry's representatives and the War Industries Board the possibility of the Government's taking control of the plants of producers. As costs of production kept rising, those steel companies which bought their pig iron in the market found that their margin of profit was very small in comparison with what they made when the Allies alone were buying war steel. Some of them, particularly plate makers, protested strongly; but not a single increase in the price of finished steel was made in the year. Washington was disposed throughout the war to think steel profits inordinate, judging the whole industry by the prodigious earnings reported by the Steel Corporation.

Little Steel for Non-War Activities

The War Industries Board was more than ever urgent in its call for larger production for war needs about midsummer. At a meeting of all steel manufacturers held in New York, J. Leonard Replogle, Director of Steel Supply, plainly said that some steel manufacturers who had profitable contracts on their books outside of Government work were not delivering to the Government at the rate it had a right to expect. Government management of the industry came nearer realization at that particular juncture than at any time in the year. It was averted by new pledges of increased concentration upon definite war needs. At the same time the War Industries Board began more rigidly to limit the amount of steel various industries might consume, though at no time was any list of "non-essential" industries drawn up. It was recognized that industries not on war work could not be feeders of the war chest if they were closed down. Keeping the right balance in this regard was the most difficult and delicate of the War Board's labors.

For a good portion of the year there was a distinct variance between the views of the leading steel producers and those of the War Board members as to the adequacy of the steel supply. Those in charge of the shipbuilding program and of the ordering of steel for France and for the Navy constantly insisted on steel shipments much in excess of current needs. This policy, justified as making doubly sure the winning of the war, left the country with enormous accumulations of war steel and of all forms of war material into which steel entered when the armistice came.

Cancellation of War Material at Year's End

As the year ended the readjustment of the industry to peace conditions was under way. Something like 3,000,000 tons of shells or of steel that had been rolled for shells was estimated to be in the country on Nov. 11. Cancellations by the United States and by the British, French and Italian governments poured in. Adjustments were made so that the steel companies would be saved from loss. The rails, cars and locomotives ordered in large quantities for the American Army in France were canceled, as were orders for 100,000 tons or more of barbed wire and rods. Yet at the end of the year war work was still a very large factor in steel plant operations. Fearful of the consequences of throwing out large bodies of workmen, the Government policy for the time being has been to make gradual readjustments, though meantime great waste is entailed by the production of materials that must be scrapped. In the case of machine tools alone it is estimated that the Government, if it finishes machines on which 50 per cent of the work has been done, will have $200,000,000 worth of standard tools to put on the market. In co-operation with the manufacturers the War Department is arranging to market these over a period of four years, so that there will be no depression in the industry.

Restoration of an Open Market

Recognizing that war prices are out of line with peace times, iron and steel manufacturers made reductions two weeks before the end of the year, ranging from $4 to $6 per ton in finished material.

These reductions were recommended by the General Committee of the American Iron and Steel Institute, which for 15 months had dealt with the War Industries Board in the matter of price fixing. The War Industries Board ceased to function on Dec. 31, and in anticipation of the board's going out the general steel committee and all its subcommittees disbanded on Dec. 21. Thus the year ended with the restoration of an open market in all products of iron and steel.

The Obstacles to Production

Production throughout the year was carried on in the face of difficulties that at times baffled every effort at remedy. On Jan. 1 freight movements were already in a tangle due to heavy snows in December; there was a clamorous demand for materials for domestic as well as export use, and with the mix-up of cars and crowded sidings there were intermittent and sudden freight embargoes. But the conditions then were as nothing compared with the chaos into which the transportation system plunged in January and February, when the country was in the grip of cold such as had not been known in years. The lack of the seaboard terminal facilities whose provision had been urged in these columns and elsewhere fully a year before, greatly aggravated the situation.

On Thursday, Jan. 17, Fuel Administrator Garfield startled the country by an order closing down industrial plants on Jan. 18, 19, 20, 21 and 22 in all states east of the Mississippi and for nine Mondays beginning Jan. 28, making a total of 13 working days. While shipyards, steel mills and metalworking establishments having Government contracts were exempt from the order, as were all industries engaged in the production of fuel, the output of steel in January and February was much below the December rate. The chief aim of the order was to reduce freight shipments for a period long enough to bring relief to the general railroad congestion. Hundreds of ships were tied up at Atlantic seaboard waiting for coal so that they might carry needed food and war materials to the Allies and the American army in France. The stoppage of industry helped to lift this blockade and also permitted the country to catch up in part on fuel.

Blast Furnace Output Reduced by Poor Coke

After the winter checks production bounded upward, but the inroads of the military draft on the labor supply and the tardy Americanization of immigrant workmen had an effect on coal mining which definitely limited iron and steel output. Poor coal made indifferent coke, and off iron and low-grade steel were natural results, with reductions in quantity as well as quality. The fact is well illustrated in blast furnace performance. In July, with 360 furnaces in operation, the total daily production was 110,000 tons per day, or no more than the average for April, May and June of 1917, when only 335 furnaces were in blast. What repeated bankings did is shown by the January iron output, the lowest since May, 1915 (just before the European war demand developed). In January the 315 furnaces produced on the average less than 250 tons per day per furnace, or nearly 100 tons per day less than a normal average.

Loss through humidity of August was overcome in part by a better operating regime and September made a record in pig iron output. October, commonly a month of records, bade fair to help make good the deficiency of the first two months of the year, but an epidemic of influenza proved a fresh barrier to full performance. November likewise showed a further falling off. The indicated pig iron output of the year is 38,700,000 tons, against 38,621,000 tons in 1917. Until late in the year it seemed probable, owing to the low ouput of January and February, that the 1918 pig iron production would fall below that of 1917.

Expansion in Steel Making

Expansion in steel making, through the relative ease of building open-hearth furnaces and the utilization of large proportions of scrap, brought the output at the high point of the year in September to a rate of 47,000,000 tons annually. For several months after the disastrous checks of January and February it was 42,500,000 tons. Continued additions of electric furnaces for the manufacture of alloy steels and of steel castings were a feature of the year. We estimate the production of open-hearth steel ingots for the year at 42,200,000 gross tons, which compares with 43,500,000 tons for 1917.

Owing to the enlarged program of gun making, the supply of low-phosphorus pig iron was a matter of some concern, and special efforts were made to increase the available ores for such iron. Had not acid steel ceased to be a wide requirement for munition making, the supply of low phosphorus material would have been entirely inadequate.

The War Demand Briefly Stated

Plate capacity had increased by March 1 to 6,000,000 tons, but new plate mill construction was rushed and present capacity approximates 7,500,000 tons. A 10,000,000-ton (deadweight) ship program in 1919 (though 8,000,000 tons is probably nearer what could be realized) would require some 3 to 3½ million tons. Great Britain asked for 300,000 tons in March at the rate of 5000 tons weekly, following closely an agreement to give Japan 100,000 tons on contracts made before the export embargo, at prices running up to 10 cents per pound, and 75,000 tons at the Government price of 3.25 cents, Pittsburgh. About 170,000 cars were bought for use abroad and on the railroads of the United States. As early as April it was asserted that 75 per cent of the plate output must go to Government uses and the figure approached 100 per cent by October.

The principal war demand was, of course, for shell steel. In the first half 1,500,000 tons was rolled. The needs of the second half were put at 2,500,000 tons, but this amount swelled by the third quarter to 3,500,000 tons or more. Orders for no less than 2200 miles of railroad track for France were placed, less than 200 of which was narrow gage. Orders for about 70,000 cars were also taken for France and at least 500 locomotives and 9000 cars for Italy, and barb wire by the third quarter of the year was asked for at a rate exceeding manufacturing capacity by fully 20 per cent. In the year 124,000 tons were shipped to France, 65,000 to Great Britain, 60,000 tons to Italy, and 14,000 tons of wire rods to France. The sheet buying for direct war purposes totaled 160,000 tons.

The unexpected expansion in the amount of material called for by our war measures arose in part from the initiative taken by General Pershing in making definite bargains for the delivery to Great Britain of certain steel supplies in exchange for artillery.

Important steps were definitely taken in June to increase shell output by utilizing foundries of the country for casting hollow shells of the mixture of pig iron and steel scrap commonly known as semi-steel, thus to make it possible to swell the flow of munitions without interrupting the overloaded steel industry except so far as it remained also a bidder

for steel scrap. This work was all halted by the stopping of the war.

How the War Demand Was Met

The delivery rate of steel reached in late summer was 33,000,000 tons per annum, or about 90 per cent of production capacity. In late July the War Industries Board put the second half needs at 20,000,000 tons and less than a month later at 23,000,000 tons against a possible output then of 17,500,000 to 18,000,000 tons. The war demand expressed in another way proved (at time of late summer) that shell steel was wanted at a rate of 15 per cent greater than shipments and plates at more than 12 per cent greater than mills could produce. As early as March shell orders taken filled the plants of the contractors to the end of the year.

Among the big developments in direct war matters was the decision of the Government to co-operate with the United States Steel Corporation in the establishment of a gun and projectile plant calculated to be by all odds the largest in the world. The announcement of this stupendous enterprise, the Neville Island plant at Pittsburgh, first made in THE IRON AGE on April 11, was followed in about a month by the first of two successive arrangements with the Midvale Steel & Ordnance Co. for two 16-in. howitzer plants.

Prices

There had been three months of Government prices on major items in 1917 and the trade had absorbed the general impression that on reconsideration lower levels would obtain. On the reaffirmation for the first quarter of 1918, however, there was no change, but the new stipulation was made that the portions of existing orders shipped in a succeeding quarter would take the prices prevailing at the time of shipment. An element of uncertainty was thus injected into the situation which militated against freedom of contracting. Manufacturing consumers, as events clearly proved later, had meanwhile laid in material against increasing war demand, and good margins of stocks at the year's incoming allowed them to keep producing, though at the decreasing rate enforced by labor, transportation and subsequent priority restrictions. Thus, in spite of the reduced and eventually negligible quantities of steel which the mills could ship to such buyers as the year wore on, there were few if any shutdowns or failures on account of material shortage.

The fixed price principle was extended in scope and on the whole represented an advance in cost to consumers to which had to be added increases in freight rates, and, of course, in wages. For the second quarter steel producers obtained the benefit of $1 per ton reduction in scrap and of $1 per ton in steel-making pig iron. But for the last quarter basic iron and foundry iron were given a $1 raise.

Lake Superior ores were put up 45c. per ton beginning July 1, at lower Lake ports, to compensate for the 33.60c. per ton freight advance, but ore producers pointed out that this did not provide for two 10 per cent wage advances. For the three months beginning Oct. 1 they were carried 25c. farther against a request for 50c. and it was then that the last pig iron increases were made.

Throughout the year the iron and steel committee of the American Iron and Steel Institute through its various sub-committees was engaged quite fully on price making under arrangement with the Price Fixing Committee which had been established by the War Industries Board. Various items came under its survey from time to time, and the prices fixed have all appeared in these columns, later to be incorporated in a pamphlet. The cessation of Government control and the re-establishment of an open market were referred to in an opening paragraph.

One exception was the matter of rails for domestic use. The naming of $55 per ton for Bessemer and $57 for open-hearth rails at Washington was merely the settling basis on Army and Navy purchases for the war, an open price otherwise remaining.

Novel Basing of Pig Iron Prices

The novel development in price matters was a partial zoning of pig iron prices adopted to give higher prices proved to be necessary by Virginia and Tennessee furnaces. Furnaces north of the Potomac and east of the Alleghenies after Oct. 1 did not need to quote the fixed price on the basis of the furnace location, but as of a Pittsburgh location and furnaces south of the Potomac were given Birmingham as a basing point.

Two other noteworthy items should be mentioned. Agricultural implement makers, apparently under the promise or request not to ask farmers more for their products, succeeding in getting, with the Administration's cognizance, a concession from the steel makers concerned of $5 per ton on steel bars. Then, as the year closed, and these bar purchases were only $1 a ton under the general market, the farmer buyer began to look for lower prices.

The other point was the official recognition on July 1 of Pittsburgh as the only steel basing point. On the strength of the original Presidential price announcements Chicago had also been named, with no inconsiderable confusion in the face of trade practices to the contrary.

General Domestic Business

General domestic business suffered a gradual compression. Through the control of fuel by the Fuel Administration power to force slowdowns of non-essential activities was recognized if natural causes did not bring this about. Similarly the preferential lists for guidance of mills in the taking of steel business out of any surplus capacity were factors. The curtailment of the manufacture of passenger automobiles was a conspicuous typical instance. The great question of supplies of raw materials became indeed so acute that in September the War Industries Board undertook through the Census Bureau an inventory of stocks in the possession of the manufacturers of the country.

Meanwhile the lot of the jobbers was hard. They were first authorized to replenish material which they had offered for war activities, but difficulties to get mills to enter, let alone deliver, anything on this basis resulted in giving warehouse purchases a priority rating. This however was so far down on the list that though orders were entered on mill books no deliveries were forthcoming. The net result was that jobbers' stocks became so low that emergency service of the warehouse to the war contractor was really theoretical.

Profits

In contrast with the repeated arguments for higher finished-steel prices and claims of the smaller and non-integrated producers that prices were rapidly vanishing stand the earning records of the United States Steel Corporation. Earnings for the third quarter of 1918, $144,948,936, or before an allowance was made for war taxes, were 10 per cent more than those for the third quarter of 1917, and those for the second quarter, $153,273,641, were over 6 per cent more than the amount for the cor-

responding quarter of 1917. The earnings for the first quarter of the year were by comparison only $88,546,622, to be accounted for largely, if not wholly, by the railroad tangle of the winter months at the beginning of the year. In spite of this check the earnings for the first nine months of 1918 totaled $386,769,199, against $389,595,891 for the corresponding three-quarters of 1917, but much greater reductions had to be made for taxes, those for the third quarter totaling no less than $101,987,387, or 70 per cent of the gross. As a result, the dividends on the common stock of the corporation for the last quarter were cut from a total return rate of 17 per cent, which had been obtaining for 18 months, to 13 per cent.

Labor

The year was memorable in labor developments affecting the whole industry. Disputes that might have led to widespread strikes were reported in several quarters in May and labor leaders quickly carried these to the National Labor Board at Washington. The labor unrest was due largely to the activity of union organizers, whose slogan was the eight-hour day and collective bargaining. Although there had been an agreement in 1917 between labor leaders and representatives of employers' organizations that conditions at the beginning of the war, particularly as to union or open shops, would not be disturbed, it was plain that the authorities at Washington were quite willing to see the extension of union influence. Early in August the War Labor Board made an award in the case of the employees of the Bethlehem Steel Co., calling for the eight-hour day, a shop committee and the abolition of the bonus system, though the company itself had not requested arbitration by the board.

Evidence accumulated that organized labor was striving to get a foothold in the steel industry, and a largely attended meeting of steel makers and important steel consumers was held in New York Aug. 28. No collective action was taken, however, but on Sept. 26 the Midvale Steel & Ordnance Co. and the Lukens Steel Co. announced that they had established a system of employee representation for the handling of all questions affecting employees' interests. In the same week the United States Steel Corporation gave notice to its employees that on Oct. 1 it would establish the eight-hour basic day. This was in effect a 10 per cent advance for workmen employed 10 hours a day, since the plan involved the payment of time and a half for overtime, while for men working 12 hours a day the eight-hour day meant an advance of 16 2-3 per cent, since for 12 hours' work they received 14 hours' pay. Other steel companies promptly adopted the eight-hour day as the basis of pay, though in view of the scarcity of men none of them could limit a man's day's work to eight hours and the men did not desire such limitation. The advance of Oct. 1 was the eighth that had been made at iron and steel works in the period beginning Jan. 1, 1916. It brought the pay of laborers working 10 hours up to $4.20 a day.

Eventful Times in Iron Trade History

BY GEORGE SMART

MODERN wars have emphasized the importance of iron in a most positive manner. One of the principal reasons for the overthrow of the Confederacy in the Civil War was the failure to develop the iron industry in the South. James Ford Rhodes, in his "History of the Civil War," describes the miserably defective transportation facilities of the Southern States, and adds: "Lack of iron was the serious difficulty; if an adequate supply of this metal had been available, the railroads could have been kept in repair. A study of conditions in the South can not fail to emphasize the dependence of modern civilization on iron; it will also cause surprise that practically nothing had been done to utilize the rich deposits of iron ore and the abundance of coking coal in many of the Southern States. Everywhere is one struck with a painful scarcity of iron." Mr. Rhodes remarks that in Alabama, where the industry made a better showing than in other parts of the South, one of the "large and improved" furnaces made an average of 13 tons daily for a month!

In other wars of recent years the importance of iron has been recognized, but never has it occupied such a transcendent position as in the war of 1914-1918. This fact is due in part to the tremendously valuable iron ore deposits of Alsace-Lorraine, which have been a vital factor in the world controversy, and in part to the vastly increased use of iron and steel products and machinery in the greatest conflict of all history. Hence, the story of the iron markets of that period will always be of absorbing interest. Preparatory to a review of the trade during the eventful four years and three months of hostilities, brief reference may well be made to financial conditions at the opening of the war and to a little preliminary history.

Conflict Long Feared

For years before the great war was started, the world had feared a mighty conflict in Europe. For at least a generation serious thought had been given the subject by bankers, political economists and business men. Various estimates of the probable daily cost of a war participated in by five or six nations were made and, in spite of the fact that all estimates were very far below the cost of the Great War of 1914-1918, now estimated at $150,000,000,000, the opinion was freely expressed that such a conflict could not last long because of the tremendous financial outlay which would be necessary. Although the possibility of the clashing of a number of the nations was continually kept in mind during a long period, the inauguration of hostilities at the close of July, 1914, came to the great nations with almost stunning force.

Alexander Dana Noyes, in his "Financial Chapters of the War," says: "The shock came upon the world's great financial markets with as complete a violence and suddenness as it is possible, in an event of such immense importance, to imagine. It is probable that no other war in modern times—with the possible exception of the Franco-Prussian war of 1870, the circumstances of whose beginning were somewhat like those of 1914—has taken the great financial communities of the world so absolutely off their guard." Then came what Mr. Noyes describes as "unquestionably the most formidable panic of history." Is it, then, a matter of wonder that the iron trade was profoundly affected by the world-shaking events of July and August, 1914?

The Period from 1907 to 1914

Following the panic of October, 1907, came rapid decrease in production of pig iron and steel, decline in prices and general depression from which there was not complete recovery until 1912, a year of high prices and general prosperity, which continued through the first half of 1913. The last-named year was characterized by a collapse of the iron market. Although there was weakness in pig iron earlier in the year and in

Southern iron particularly, a steady decline starting in January, the downward tendency was most marked in the fall and winter months. Financial troubles traceable to the Balkan war of that year, the passage of the low tariff bill, the disturbances in Mexico, accompanied by "watchful waiting" in this country, and agitation of currency legislation were among the principal factors that had an unfavorable influence upon business. The effects of the low tariff were not, however, of positive importance in 1913. Although German Bessemer bars were offered at $5 to $6 per ton lower than the prevailing prices for the American product and German billets were obtainable at $2 to $3 below the American price, very little German steel was imported. A limited tonnage of low phosphorus pig iron was brought from England.

The Year of Prostration—1914

The next year, 1914, the first of the war, was one of the worst in the history of the trade. The effects of the Underwood tariff, passed in October, 1913, became more clearly apparent early in 1914, and before many months there were importations of considerable tonnages of wire nails, pig iron, billets, bars and cotton ties. Agitation in Congress against business, also Mexican troubles, with fear of war with that country, continued to have a depressing influence. The light buying by the railroads was one of the indications of unsatisfactory underlying conditions. Financial reports of many companies were unfavorable and the United States Steel Corporation narrowly escaped failure to earn its preferred stock dividend in the quarter ended March 31, and after paying dividends, the deficit for the year was $16,971,983, compared with a surplus of $30,582,183 in 1913. A large percentage of the pig iron was sold at a loss. Then, on top of all other adverse events, came the declaration of war by Austria, Germany, Serbia, England, Russia and France. The Vienna stock exchange closed its doors July 27, as did also that of Brussels; the Paris Bourse shut down on July 28; on July 29 Berlin forbade all transactions on credit; the London stock exchange closed its d rs on July 31 and New York's shut-down came an hour after London's. No such action had ever before been taken by London, and it was evident to the world that developments of unprecedented importance were pending. Almost without exception, predictions as to what would happen in the financial world failed of fulfillment and all engaged in the manufacture and sale of iron and steel who hoped that the war would quickly result in tremendous demand for their products were disappointed. The orders from abroad did not come that year, which, on the whole, was highly unsatisfactory, being marked by declining prices, reduced production, slack demand and poor financial results. The production of pig iron in 1914 was 23,332,244 tons compared with 30,966,152 in 1913, the year of largest output up to that time.

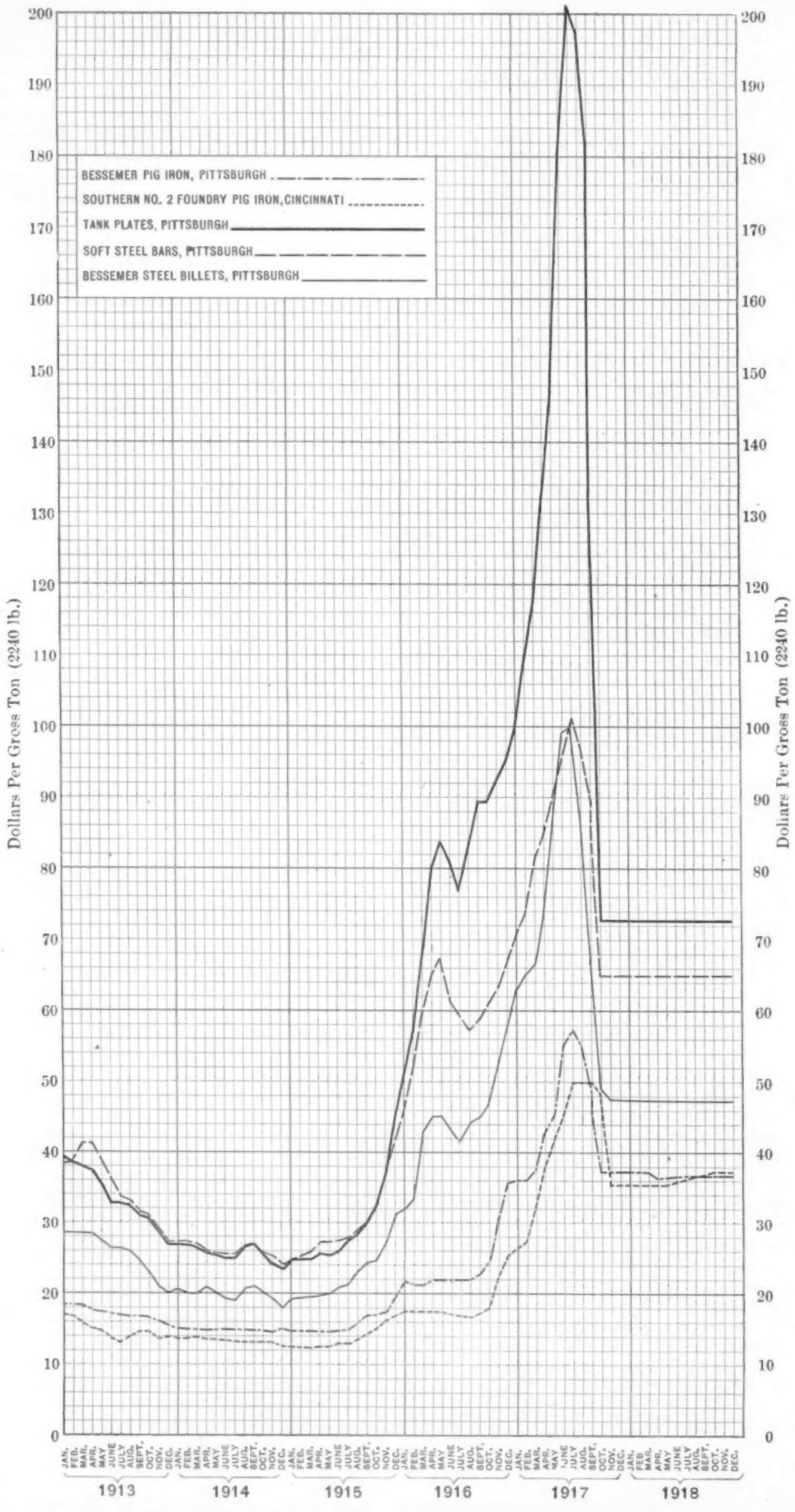
The Year of Recovery—1915

Improvement set in when the year 1915 was in its early days. The rate of production of steel works had fallen as low as 25 to 30 per cent in December, 1914, but the new year started with about 40 per cent of capacity in operation and by the end of January the general demand had increased to such an extent as to require the use of 55 per cent of capacity. Conditions were not, however, free from weakness in the first quarter of the year, as was shown by the difficulty experienced in establishing moderate advances in prices of bars, shapes and plates and by the quiet drive made by some merchant furnaces which in March booked large tonnages for delivery as late as the last half of the year, some sales being at as low as $11.50, Buffalo, and $9.25, Birmingham. It is a noteworthy fact that pig iron prices for the first twelvemonth of the war advanced only slightly, Bessemer only 30c. per ton, while foundry grades showed almost no change. Finished materials advanced from $3 to $5 in that period. While some orders for shrapnel, barbed wire and other products needed by the European belligerents were placed early in 1915, it was not until after three months had passed that a large tonnage was booked in this country, but in May the buying of war materials started on a tremendous scale. Although, as stated in the beginning of this review, financiers had feared for years that there might be a general European war, few had thought of this country becoming involved, and despite the urging of a small number of far-seeing men in the United States, this republic had refused to prepare for war and the few steel companies which had been successful on a moderate scale in the manufacture of armor plate, guns and ammunition had been treated more as if they were robbers than as patriots, and the United States Government had planned to go into competition in armor plate making, which might result disastrously to owners of private armor plate plants. The iron industry, at the opening of the war, had a splendid foundation on which to build. It had its great deposits of iron ore and coal, and its many magnificent plants for the manufacturing of implements of peace, but was almost entirely lacking in plants in which to convert steel into munitions or to make airplanes, submarines and other implements of modern warfare. American enterprise and ingenuity quickly responded to the appeal of the Entente Allies. New plants were built, old ones improved and soon the iron ore of America was being converted into pig iron, the pig iron into steel and the steel into the shells which enabled the armies of France and England to win the great battles which checked the advance of the Huns and made it possible in 1918 to drive to ignominious defeat the armies of autocracy. Let this fact never be forgotten.

Production and Prices

The output of pig iron in January, 1915, was at the rate of about 19,000,000 tons per year, or about 60 per cent of the output in a normal year. By April the rate of production was 25,000,000 tons and by December the rate was over 38,000,000 tons. The output for the year was 29,916,213 tons. Price advances for the year were moderate as one reviews them in light of the later upward movement, but at the time they seemed rapid. Advances for the year were: Bessemer pig iron, $5; billets, $10; No. 2 foundry, $5; sheet bars, $14; plates, $18; beams, $14. In reviewing this wonderful year THE IRON AGE of Jan. 6, 1916, said:

"Refreshing and inspiring was the change from depression to activity wrought in 1915. Those who were weary, almost to hopelessness, with the long fight against adversity, which began in 1913 and seemed destined to continue indefinitely, have been reinvigorated, and again can make plans for the future with some confidence. The dismal array of idle workshops, cold blast furnaces, dead steel works and silent rolling mills has been touched by the magic hand of a reviving demand and quickened into life and renewed energy. Everywhere has idleness given way to full employment, busy workmen thronging factories whose gates had long been closed against them. The public employment bureaus have almost disappeared, for ample earnings have filled empty pockets and households which had suffered bitter privation for two winters are again abounding with comforts, if not luxuries. Employers are no longer studying their lists of workmen to see who can be laid off with the least suffering among dependents, but are seeking more men for the purpose of getting out increased product. Instead of exhausting their energy and ingenuity in the effort to get orders to enable their works to be run on part time, manufacturers are planning enlargements, extensions and


BESSEMER PIG IRON, PITTSBURGH
SOUTHERN NO. 2 FOUNDRY PIG IRON, CINCINNATI
TANK PLATES, PITTSBURGH
SOFT STEEL BARS, PITTSBURGH
BESSEMER STEEL BILLETS, PITTSBURGH
Dollars Per Gross Ton (2240 lb.)
Dollars Per Gross Ton (2240 lb.)
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1913
1914
1915
1916
1917
1918

PRICE FLUCTUATIONS OF LEADING PRODUCTS FROM JAN. 1, 1913, TO DEC. 1, 1918

even wholly new producing units to meet the continually increasing demand. Not the least important feature of the marvelous change wrought in the condition of the iron and steel trades is the improvement in financial results. A year ago the manufacturer able to show a profit on his operations was an exception. To-day any kind of a plant must be run most inefficiently to have its balances written in red ink."

A Year of Prosperity—1916

The year 1916 was the most prosperous in the history of the iron trade up to that time. While in other years there had been great prosperity and iron and steel plants had been operated to full capacity during a large part of the periods, never before were the plants driven continuously throughout 12 months. The demand from Europe was tremendous, and for the year the exports of machinery were valued at $226,461,624 compared with $134,128,862 in 1915. The exports reported by tons in 1916 amounted to 6,102,104 tons compared with 3,513,453 in 1915. One of the most important features of the demand from the European Allies was for large steel rounds for shell making, and prices for this product rose rapidly to high figures. Owing to the fact that the rail mills were not fully employed they were able to do a very profitable business in rolling the shell steel. Forging plants also made large profits on shell forgings and the demand for barbed wire was so heavy that prices were repeatedly advanced, causing great excitement in the wire trade. Plates advanced to higher quotations than had even been recorded, and even Chicago mills participated in contracts placed by foreign shipbuilders. For pipe, bars, sheets and tinplate the demand was tremendous. One evidence of the unusual strength of the market was furnished by the action of steel bar manufacturers in refusing to make special concessions to the agricultural implement manufacturers as had been done in many earlier years.

Embargoes Declared

With the great demand for export and domestic requirements of unusual magnitude, railroad and vessel service proved inadequate, congestion prevailed at many ports and inland centers, and railroads were compelled frequently to declare embargoes against shipments. A striking feature of the year was the increase in the production of ferromanganese to 221,532 tons compared with 149,521 tons in 1915 and 106,083 tons in 1914. This was necessitated by restrictions on exports of the alloy imposed by the British Government. While in June, 1916, $250 was a usual contract price and as high as $450 was paid for small lots, compared with $38 in July, 1914, competition of the American with the British product brought the British price down to $164, seaboard, while some domestic ferromanganese was sold in November as low as $155 in the Central West.

Earnings of the steel companies in 1916 were very large and the financial condition of many was vastly improved. Contracts were freely placed late in the year at high prices for distant delivery. Labor also shared in the prosperity and advances in wages were frequent.

Among the price advances of this remarkable year were: Bessemer pig iron, Pittsburgh, from $21.58 to $35.58; Southern No. 2 foundry, Cincinnati, from $17.90 to $25.90; steel bars from 2.03c. to 3c., Pittsburgh; plates, from 2.25c. to 4.25c.; beams, from 1.90c. to 3.25c.

Prosperity Continues in 1917

Wonderful as was the year 1916, it was followed by a year having at least one new feature which will make it stand out in the history of the trade—that of Government regulation which embraced almost all products from ore to scrap and was carried out without a line of legislation except that relating to coke embodied in the Lever act for the regulation of fuel and food. But the main reason for never forgetting 1917 is that it was the year in which the manufacturers of iron and steel unitedly and unselfishly came to the support of the Government following the declaration of war, April 7, by the United States. They did this not only in cooperating in the price regulation policy, but in every possible way within their power. The year was not a record breaker in pig iron production, owing largely to inability to operate the coal mines to capacity and to the failure of the railroads to meet the heavy demands upon them, especially during the extremely severe weather of the first two months of the year. Production of pig iron declined from 39,435,000 tons in 1916 to 38,650,000 tons in 1917. Production of steel ingots and castings was, however, the greatest on record, it being about 45,000,000 tons, compared with 42,773,680 tons in 1916.

Rapid Price Advances

After the United States went to war prices advanced at an astonishing rate, and in the summer plates sold as high as 10c. for early delivery and steel bars at 5c., although in the beginning of the year plates were quoted at 4.45c. and bars 3.15c. Other price advances comparing those of August 15, 1916, with those of the year later were: Bessemer pig iron, Pittsburgh, $30; No. 2 Valley, $34.75; open-hearth billets, $55; beams, $44; heavy steel scrap, $16.25.

While prices were ascending, Government officials were insisting that concessions must be made on purchases for war needs of the United States and manufacturers manifested a willingness to reduce prices to the Government to the full extent which patriotism and fairness should dictate.

Only a few days after Congress declared that a state of war with Germany existed, manufacturers agreed to furnish steel for the navy and other shipyard work at 2.90c., Pittsburgh, for plates, and 2.50c. for shapes and bars, although at that time plates were selling for early delivery at 6c. and bars and shapes at 4c. Within two months the steel companies booked 610,000 tons of these materials below prices. Another important question soon developed, that of the prices to be charged the Allies who had paid 4.50c. for shell steel for 1917 delivery or $40 a ton more than the price made to the United States Government. The President on July 12 made an appeal to manufacturers of all kinds of products for one price for all policy. He said in part: "We must make the prices to the public the same as the prices to the Government. Prices mean the same thing everywhere now. They mean the efficiency or inefficiency of the nation, whether it is the Government that pays them or not." On the same day that the President's address was published members of the special committee appointed by the American Iron and Steel Institute conferred at Washington with the Secretaries of War and the Navy, the Chairman of the United States Shipping Board and the Chairman of the Committee on Raw Materials of the Advisory Commission of the Council of National Defense. After the conference Secretary Baker, as chairman of the Council of National Defense, made a statement in which he said: "The steel men repeated their assurances that their entire product would be available for the needs and they were doing everything possible to stimulate an increased production and speed deliveries. The price to be paid for the iron and steel products furnished was left to be determined after the inquiry by the Federal Trade Commission is completed, with the understanding that the price when fixed would insure reasonable profits and be made with reference to the needs of this vital and fundamental industry."

President Announces Prices

The President's appeal, the investigation of the Federal Trade Commission as to prices and the general feeling that there would be a price readjustment had an important effect on the market and there was very little buying in August and September. Gradually it became apparent that no good results would come from the investigation by the commission, owing largely to the difficulty of basing prices on so-called fair profits when the costs differed so widely at different furnaces and rolling mills. The War Industries Board took up the matter with the steel manufacturers and an agreement was reached in the third week in September resulting in President Wilson on Sept. 24 announcing the following prices: Mesaba non-Bessemer ore, $5.05; Connellsville coke, $6; pig iron, $33; steel bars, 2.90c., Pittsburgh; structural shapes, 3c. and plates 3.25c. It was afterwards explained that the pig iron price was at furnace for Northern or Southern, No. 2 foundry and basic iron. The reduction was $22, as a $55 basis had ruled for several months. The reductions on finished materials were also heavy.

Very little business was transacted for several weeks after the new prices were announced, although large tonnages of pig iron were sold in November on the Government basis. Mill capacity was almost monopolized by the Government. The standing Committee on Steel and Steel Products was appointed by the American Iron and Steel Institute and was known as the general committee, while numerous sub-committees representing products all the way from iron ore to scrap were appointed in order to work out prices for many products in harmony with those named in the first general announcement. On Dec. 28 President Wilson announced that the agreed prices would be continued until March 31, 1918.

Entire Output for War

When the United States entered the great war, it was estimated that the needs of the Government for war purposes would not be over 5 per cent of the country's steel output, but it was soon apparent that the demand would be vastly larger. The shipbuilding program expanded rapidly and the Government made contracts involving many millions of dollars for additions to the Navy, for munitions, airplanes, shells and other implements of war, so that eventually all the country's steel output was taken for war and contributory purposes.

Iron and steel exports reported on the tonnage basis amounted to 6,227,737 tons for the year 1917. The value of all machinery exports for the twelve months amounted to $287,623,962 compared with $226,461,624 in 1916. An important feature of the year was the heavy buying of rails for Russia, while large orders were also placed by France, Italy and Spain. The total exports of rails were 510,439 tons. Russian orders also included 1500 locomotives and 30,000 cars. Earnings of the leading steel companies were enormous, but a large part was taken by the Government in the shape of taxes. Wages were advanced liberally during the year and there were few strikes.

Following the year 1917, with its great prosperity and with its close regulation of prices by the Government, came the last year of the war period with its continuation of Government control and its many interesting features described in detail elsewhere in this issue.

Developments of the Pittsburgh Market in 1918

BY ROBERT A. WALKER

WITH war demand taking the full output of blast furnaces and steel plants and with the Government in control of prices, the usual market factors were missing in the Pittsburgh iron and steel markets during the greater part of 1918. Selling organizations had little work to do except in expediting shipments of material to manufacturers engaged in war work. Not until the signing of the armistice on Nov. 11 was trade unrestricted, and from that date until the close of the year business was of a halting nature and the orders placed were mostly small lots for immediate delivery. The adoption of new prices on steel products, effective Jan. 1, is too recent to require extended comment, it being sufficient to say that a free and competitive market had its real inception with the announcement of reduced prices by steel companies.

Pig Iron

The year started out with a large demand for pig iron, mostly Bessemer and basic, with practically none to be had. The price for first quarter was $33 for basic, Bessemer $36.30, gray forge $32, No. 2 foundry $33, and malleable $33.50. All steel companies were very short of metal. Very little pig iron was sold in January, as it was difficult to get, furnaces being well sold up. About the middle of the month from 40 to 50 blast furnaces were banked on account of lack of coke. Steel works which ordinarily had enough iron for their own needs, in trying to increase their steel supply, searched the markets for iron with very little results. The acute shortage of iron grew steadily worse in February, conditions becoming very critical on account of the large number of furnaces that were obliged to bank because of coke shortage. In February the output of pig iron in Pittsburgh and nearby districts was not over 50 to 60 per cent of normal. Railroad congestion added new difficulties in February and merchant furnaces got very far behind in shipments. Considerable selling for second half of the year took place in February, all grades of iron being in great demand. Furnace operating conditions improved in March.

Rising costs of production created a serious problem for merchant furnaces, which appealed to the War Industries Board for higher prices in second quarter. Instead of increasing prices, however, the War Industries Board ordered a reduction of $1 a ton, making basic iron $32, Valley furnace, while the differential of 10 per cent in favor of Bessemer iron was maintained, the price for second quarter therefore being $35.20, Valley furnace. No. 2 foundry was not changed, remaining at $33, Valley furnace. Merchant furnaces entered second quarter with their order books well filled for the entire year and were unable to entertain the many inquiries for iron.

At a meeting of the furnace operators in Pittsburgh on April 25, steps were taken to mobilize the iron industry so as to divert iron into most essential war work. A complete survey of the pig iron situation by the Committee on Pig Iron, Iron Ore and Lake Transportation of the American Iron and Steel Institute was begun in May, questionnaires being sent to all furnace operators. This work was undertaken by the committee on behalf of the Steel Section of the War Industries Board.

Freight rates on pig iron from the Mahoning Valley to Pittsburgh were increased early in June from 95c. to $1.10 per gross ton, and on June 25 a further increase to $1.40 a ton was put into effect. Production and shipment of pig iron came under Government control late in the first half of the year, a development of which was the allocation of iron by the Steel Section of the War Industries Board to war contractors who could not find supplies in the open market.

Iron producers in June began a campaign for an increase in prices, but the War Industries Board declined to make any change. Allocations increased in the third quarter of the year, one important allocation

covering 180,000 tons of basic iron for England. Sales of pig iron, except off grades, for which there was a good demand, became almost nil.

Effective Oct. 1, all grades of pig iron, with the exception of Bessemer, were advanced $1 a ton by authority of the War Industries Board. Until the signing of the armistice on Nov. 11, there was a very tight pig iron market with demand greatly exceeding the supply. The end of the war brought numerous attempts to cancel, but sellers generally resisted cancellations and in many instances consumers accepted a compromise of spreading out deliveries of contract iron over longer periods. In the last six weeks of the year there was considerable free iron available, but sales were largely limited to small lots for prompt delivery.

On Dec. 11 the general committee of the American Iron and Steel Institute recommended a reduction of iron prices $3 a ton, effective Jan. 1, but furnaces were not disposed to accept this recommendation at once and generally refrained from selling during the last two weeks of the year.

The following table gives the monthly prices in 1918, averaged from weekly reports in THE IRON AGE, on Bessemer, basic, No. 2 foundry and gray forge iron at Valley furnace, to which freight rates per ton should be added. The rate was 95c. to June, then $1.10, and on June 25 it was increased to $1.40.

Average Monthly Pig-Iron Prices, f.o.b. Valley Furnace—Per Gross Ton

Month	Bessemer	Basic	No. 2 Foundry	Gray Forge
January	$36.30	$33.00	$33.00	$32.00
February	36.30	33.00	33.00	32.00
March	36.30	33.00	33.00	32.00
April	35.20	32.00	33.00	32.00
May	35.20	32.00	33.00	32.00
June	35.20	32.00	33.00	32.00
July	35.20	32.00	33.00	32.00
August	35.20	32.00	33.00	32.00
September	35.20	32.00	33.00	32.00
October	35.20	33.00	34.00	33.00
November	35.20	33.00	34.00	33.00
December	35.20	33.00	34.00	33.00

Semi-Finished Steel

There was an exceptional demand for billets, slabs and sheet bars throughout the entire year. Up to the signing of the armistice and even after that date, shipments on unfilled contracts went forward in large volume. Prices throughout the year remained unchanged, namely, $47.50 for soft Bessemer and open-hearth rerolling billets, $60 for forging billets, $50 for slabs, and $51 for sheet bars, f. o. b. Pittsburgh or Youngstown mill. A large part of the output of bloom and billet mills was steel of forging quality, in which the tremendous shell requirements of the Government were the principal factor.

During a large part of the year there was a serious shortage of semi-finished steel for re-rolling purposes and many consumers engaged in essential work could not obtain all that they required. Sheet mill operations were greatly restricted, in some instances falling as low as 35 per cent of capacity, due to the shortage of sheet bars.

In December leading producers announced a reduction of $4 a ton on all semi-finished steel and business taken in the last two weeks of the year was largely at the following prices: blooms and large billets, $43.50; small billets, $47; slabs, $46; sheet bars, $47.

Finished Iron and Steel

The shipbuilding industry and car and locomotive builders took the greater part of the output of plates and shapes during the year. Facilities for fabricating ship steel were greatly increased by the Emergency Fleet Corporation, while existing facilities for construction of cars and locomotives were taxed to their utmost. In addition, the various Government departments at Washington required a great deal of steel for building construction, both in this country and France. While plate and shape mills were almost exclusively devoted to their regular line of work, rail mills and bar mills were largely devoted to rolling of shell steel, and this work continued until almost the close of the year, curtailment of shell steel production not beginning until a few weeks after the signing of the armistice.

Some rolled products, notably sheets and merchant steel bars, suffered great loss in production due to the diversion of steel to other purposes considered more essential. Sheet mill production during the latter half of the year in particular was greatly below capacity. The steel shortage also affected wire products, the wire mills having very little material with which to fill commercial orders. A large part of the steel given to the wire mills was converted into barbed wire for military purposes, and some of the wire mills were extensively engaged in turning out shell steel.

With greatly reduced output of rails, due to rolling of shell steel on rail mills, practically the only rails rolled were for the American Army in France or the Allies and for needed repairs on domestic roads. Therefore, the rail mills enter the new year with considerable business still on their books. No Government price on rails was fixed until late in the year, as the Railroad Administration and the rail manufacturers could not agree. Consequently a considerable part of the tonnages placed for shipment abroad was left with the price open. The settling prices finally agreed upon were $55 for heavy Bessemer rails at mill and $57 for heavy open-hearth rails at mill.

An interesting development late in the year was the difficulty experienced by jobbers in obtaining replenishment of stocks because of the almost complete absorption of steel products for direct war work. An agreement finally was reached with the War Industries Board by which jobbers were to be permitted to obtain new stocks when it could be shown by affidavit that the stocks in their possession had been sold for essential purposes. Jobbers also made pledges to conserve steel for work contribution to the winning of the war, but even these things were not completely effectual in keeping jobbers supplied, as their rating of B-4 was too far down the list of priorities to enable mills to ship to them freely. In fact, steps were being taken just before the war ended to work out a better plan of meeting jobbers' requirements. The signing of the armistice, however, solved the problem, and jobbers then in many instances did not want the material they had ordered and cancellations were frequent.

The refusal of the War Industries Board on Dec. 11 to continue Government control of prices beyond Dec. 21 resulted in steel companies voluntarily reducing prices, effective Jan. 1. A schedule which the general committee of the American Iron and Steel Institute had in readiness to submit to the War Industries Board formed the basis for the price reductions, which were $5 on plates, $4 on heavy shapes, $4 on merchant bars, $7 on blue annealed sheets, $6 on black sheets, and $4 on galvanized sheets. A price of $55 was named for heavy Bessemer rails. Very little business was done in finished steel between the time these new prices were named and the close of the year. No change in wire products was made.

Wrought Iron and Steel Pipe

Makers of wrought iron and steel pipe have had well-filled order books throughout the year and during the last eight months output was devoted exclusively to direct or indirect Government work. On account of the large war requirements for oil and gasoline, the demand for oil country goods was exceptionally heavy. Considerable tonnages were shipped to Europe for the Army and Navy. The demand for boiler tubes, both welded and seamless, was also exceptionally heavy, particularly for marine and locomotive boilers. Government demand was the dominant consideration until the signing of the armistice, when pipe and tube makers were in a position again to resume shipments without Government restriction or supervision. In the middle of December a reduction of $6 a ton on both iron and steel pipe and on boiler tubes was announced by makers to take effect Jan. 1.

Old Material

Beginning Jan. 1, the scrap trade came under the regulation of the Government through the Sub-Committee on Iron and Steel Scrap of the American Iron and Steel Institute. Although up to that time Government control of pig iron and steel prices had worked

out successfully, there were many who were dubious as to the results which might be obtained in regulating scrap prices. Fortunately, however, this regulation proved much more successful than it was supposed might be possible, and while there were some violations of prices the situation as a whole was well controlled, and during the late months of the year, when scrap became scarce, the sub-committee performed a very valuable work in locating and shipping supplies to steel plants, foundries and other consumers badly in need. The base prices which became effective Jan. 1 were $30 for No. 1 heavy melting steel, $20 for cast-iron borings and machine shop turnings, and $35 for No. 1 railroad wrought. Prices on other grades were worked out to conform as nearly as possible to this base schedule. Taking effect April 1, all prices for scrap were marked down $1 a ton by order of the War Industries Board in conformity with a reduction on basic and Bessemer pig iron which became effective at the same time. A commission of 3½ per cent was allowed to dealers and brokers and during the remainder of the year this commission was generally paid by consumers. Maximum prices, as fixed by the War Industries Board, ruled to a large extent, except during the late spring and early summer months, when some concessions were made due to larger supply. Conditions ruled very firm in the scrap trade until the signing of the armistice, when practically all buying ceased and during the last four or five weeks of the year it was difficult to quote accurate market prices because of the lack of sales. Trading was largely among dealers and prices showed a falling off of several dollars a ton. In December the market became greatly oversupplied, due to large tonnages of shell steel which became available. The accompanying table shows monthly prices on the grades of scrap averaged from weekly Pittsburgh market reports to THE IRON AGE.

Old Material Prices, Pittsburgh—1918—Per Gross Ton

Month	No. 1 Cast	Bundled Sheets	Re-rolling Rails	Cast Iron Borings	Machine Shop Turnings
January	$30.00	$24.00	$35.00	$20.00	$20.00
February	30.00	24.00	35.00	20.00	20.00
March	30.00	24.00	35.00	20.00	20.00
April	*29.00	23.00	33.50	18.50	18.50
May	28.50	24.00	33.00	18.50	18.00
June	28.62	24.00	33.25	18.50	18.00
July	29.00	26.80	34.00	18.90	18.80
August	29.00	27.50	34.00	19.00	19.00
September	29.00	27.50	34.00	19.00	19.00
October	29.00	28.40	34.00	19.00	19.00
November	29.00	29.00	34.00	19.00	19.00
December	27.00	24.00	32.00	17.50	17.50

*Quotations on No. 1 cast scrap in the first three months of the year referred to cast scrap for foundries. During the remainder of the year, quotations published in THE IRON AGE were for cast scrap for steel plants, the maximum price for which was $29.00.

The Coke Trade

Prices on coke, as fixed by the Fuel Administration, remained at $6 for blast furnace coke and $7 for foundry coke, these same prices having been in effect in the last quarter of 1917, and were continued without change throughout 1918. The principal problem in the coke trade during the year was to satisfy the enormous demands. Spot coke for many months was not to be had and, in fact, it was frequently very difficult for blast furnaces and foundries to obtain sufficient shipments on their contracts. During the first quarter of the year production of bee-hive coke in the Connellsville region was greatly interfered with by cold weather and snows and railroad congestion was an even more serious factor. Many blast furnaces throughout the country were obliged to bank on account of lack of coke and pig iron production showed a severe loss. Conditions did not begin to improve until spring. From that time until an epidemic of influenza hit the Connellsville region in October, the supply of coke was fair, although at no time fully up to requirements. The influenza epidemic caused a severe loss of production during October and November and blast furnaces were again greatly inconvenienced. Production increased in December, but it was feared that the large losses incurred during October and November would be the cause of a shortage later in the winter. During the year a number of new by-product coke ovens were completed and placed in operation and thus more steel plants became independent of the bee-hive coke producers. At the end of 1918 there was in operation a total of 9940 ovens as compared with 7495 at the end of 1917, a gain of 2445 ovens. The rated annual capacity of the ovens now in operation is approximately 37,000,000 tons of by-product coke a year. This is rated capacity, however, and actual output will probably fall below this figure.

As prices show no change during the year the usual table is omitted from this review.

View of 1918 War-Time Iron Trade Conditions in Chicago

BY CHARLES LUNDBERG

PRODUCTION, not selling, was the chief concern of the iron and steel industry in 1918. Until hostilities ended, war requirements gained in volume until almost overwhelming, and with the Government directing where material should go through its priority regulations and system of allocating, the great thing was to maintain and, if possible, increase output, meanwhile keeping the Government informed.

In a little more than six weeks, conditions have undergone a tremendous reversal. Prior to the declaration of the armistice, the mills would not promise delivery for months to come, except to those who held high priority ratings, but not long after the announcement that fighting had ceased, gaps in rolling schedules loomed up as an immediate probability, with all that this entails. Consumers immediately took the stand they were entitled to assurances protecting them from loss in case of price declines, while the mills at first sought to stipulate that settlements on deliveries in 1919 would be made on the basis of the last-named Government maximum. Then the counsel of wise leaders was heeded, and that prices should be lowered was generally conceded.

The steel trade is quick to recognize symptoms and conditions. A year ago it expressed satisfaction because official pressure or regulation had radically reduced prices from abnormal levels. To-day it again has agreed to lower price levels, and also sees the necessity of restoring competition to its rightful place, realizing that peace-time business cannot be done on a war-time basis. Thus the new year is entered, despite recent hopes that governmentally approved maximums might prevail for a time and prevent a harmful collapse of the market.

Loyalty of the Trade

At times there have been anxieties arising from doubt as to the precise course to pursue under unprecedented circumstances. But to the everlasting honor of the industry it can be said these anxieties sprang from a loyal desire to do the precise thing the Government wanted done, to obey orders and comply with requests to the last detail in a manner that would contribute most to the winning of the War. The preparation of tedious and complicated reports, one after another, so that the Government could proceed intelligently in its management of distribution was no small part of the task.

Many fears on the part of consumers were not consummated. While the operations of some so-called non-essential industries were curtailed, complaints that those who were entitled to material had been neglected were negligible, a fact partly explained by the degree to which essential work became general and to

the efficacy of allocations by the War Industries Board.

In the first few weeks of the year, operations of all kinds were greatly hampered by exceptionally heavy storms and snowfalls and a shortage of coke resulting from severe weather and inadequate or interrupted rail facilities. Poor coke also was a deterrent, but finally the industry struck its stride, and it was going at practically full capacity when war contracts were canceled. With the annulment of priorities, the discontinuance of allocations and the release of jobbers from the war pledge in late November, orders began to take their regular order of precedence, except where ship, railroad and Government material was involved.

Plates for Ships and Cars

It is not necessary to say much of plates, more than that ship and car demands, and especially the former, took practically the full output of the year. At times it was difficult to see how Government needs could be fully met. The demand for hull steel is still great, but the pressure for deliveries is easier, and the outlook for industrial purposes is encouraging.

In shapes and bars, the situation for the domestic consumer was a little less acute than in plates. The structural fabricating shops were saved from disaster by the ship work allotted to them, inasmuch as ordinary building construction was under the ban, unless of an essential character. In late July, a feature of the steel-bar market was a reduction of $5 per ton granted the makers of agricultural implements at the instance of the Government. It was argued the farmer could not pay more for his machines and that the implement makers did not have a safe margin of profit.

Bar iron was to some extent substituted for mild steel bars, but not to the extent to which the makers had hoped, although late in the year their books became comfortably filled with orders which, however, did not extend far into the future. At times bar-iron capacity was idle, despite energetic effort to have bar iron used in the building of freight cars to a greater extent than is customary.

Chicago a Basing Point

In the second quarter, Chicago was a basing point along with Pittsburgh, but the end of the quarter brought the single basing point again, that, of course, being Pittsburgh. Later in the year, Western consumers, largely structural fabricators, sought to have the dual base re-established, but without success.

From the early part of the year until near its close, jobbers in iron and steel faced a perplexing problem in replenishing their stocks under the B-4 priority rating given to them. This was of little avail, despite the pledge they had given to conserve steel for war use. Having precedence was a huge quantity of steel with higher ratings. A plan was finally evolved whereby the jobbers were authorized to replace stock to the extent they had sold for essential needs in the previous month, but still their supply was disappointing and deliveries uncertain.

Distribution of Pig Iron

Consumers of pig iron, more particularly the larger ones, pursued a policy of buying well into the future. They bought early and generously for the last half of 1918, and in August for the first half of 1919. Coinci-

Pig Iron, Finished Material and Scrap, Chicago

The table below shows monthly prices of malleable Bessemer pig iron at Chicago from 1901 to 1918, inclusive, averaged from weekly quotations in THE IRON AGE, in dollars per ton of 2240 lb.

Malleable Bessemer Pig-Iron Prices, Chicago

	1901	1902	1903	1904	1905	1906	1907	1908*	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
Jan.	$15.00	$17.20	$23.24	$14.50	$17.50	$19.37	$26.00	$18.60	$17.09	$19.00	$15.50	$14.35	$17.90	$13.88	$13.00	$19.00	$30.94	$33.50
Feb.	14.87	17.75	23.00	14.50	17.50	19.19	26.00	18.25	16.75	19.00	15.50	14.14	17.31	13.94	13.00	19.00	31.75	33.50
March	15.75	18.50	22.87	14.00	17.50	19.00	26.25	17.50	16.50	18.40	15.50	14.00	17.25	14.25	13.00	19.40	35.40	33.50
April	16.50	19.50	21.82	14.00	17.50	18.77	26.50	17.50	16.50	17.50	15.25	14.00	17.05	14.25	13.00	19.50	39.00	33.50
May	15.45	21.80	20.77	14.00	17.37	18.35	26.60	17.56	16.66	17.06	15.00	14.40	16.00	14.06	13.00	19.50	43.60	33.50
June	16.25	22.00	19.50	13.85	16.65	18.00	26.25	17.37	16.50	16.75	15.00	14.50	15.62	13.88	13.00	19.50	50.25	33.50
July	16.25	22.75	18.66	13.75	16.37	18.37	25.62	17.50	16.90	16.56	15.00	14.50	14.65	14.00	13.00	19.50	55.00	33.50
Aug.	16.30	23.00	17.59	13.75	16.50	18.95	24.80	17.50	17.12	16.50	14.80	15.10	15.00	14.00	13.44	19.00	55.00	33.50
Sept.	16.00	24.00	16.94	13.50	16.56	20.12	24.40	17.26	18.50	16.40	14.50	16.25	15.00	13.25	14.30	19.00	54.75	33.50
Oct.	15.75	23.90	16.25	13.75	17.37	21.32	22.40	17.00	18.50	16.06	14.50	17.10	15.20	13.00	15.25	19.88	33.50	34.50
Nov.	15.81	23.87	15.00	15.87	19.00	24.16	20.25	17.00	19.00	16.00	14.35	17.87	14.87	12.88	17.13	25.80	33.50	34.50
Dec.	17.00	24.00	14.50	16.50	19.50	26.00	18.75	17.00	19.00	16.00	14.35	18.00	14.63	12.90	18.20	29.50	33.50	34.50

*From this time on the prices are given as at furnace near Chicago, and 35c. to 50c. per ton should be added to get the price delivered to Chicago foundries.

The table shows the course of prices of pig iron, finished iron and steel and old material in Chicago market in 1918, compiled from the weekly reports in THE IRON AGE:

Pig Iron, Finished Iron and Steel and Scrap, Chicago

	Northern Coke No. 2	Lake Superior Charcoal	Southern Coke No. 2	Common Bar Iron, Cents	Soft Steel Bars, Cents	Structural Steel, Cents	Cast Borings, Net Ton	No. 1 Railroad Wrought, Net Ton	Heavy Cast Scrap, Net Ton	Heavy Melting Steel Scrap, Gross Ton	Old Steel Rails Rerolling, Gross Ton
January	$33.00	$37.50	$37.00	3.50	3.115	3.215	$16.50	$31.25	$25.90	$30.00	$35.00
February	33.00	37.50	37.00	3.50	3.115	3.215	16.50	31.25	26.06	30.25	35.00
March	33.00	37.50	37.00	3.50	3.115	3.215	16.50	30.75	27.25	29.87	34.75
April	33.00	37.50	37.00	3.50	2.90	3.00	16.06	30.20	27.12	28.75	33.50
May	33.00	37.50	37.00	3.50	2.90	3.00	15.65	29.75	26.70	28.80	34.00
June	33.00	37.62	37.00	3.50	2.90	3.00	15.87	29.75	27.12	29.00	34.00
July	33.00	38.00	38.00	3.50	3.17	3.27	16.50	29.75	28.06	29.00	34.00
August	33.00	38.00	38.00	3.50	3.17	3.27	16.50	29.75	29.10	29.00	34.00
September	33.00	38.00	38.00	3.50	3.17	3.27	16.50	29.75	30.00	29.00	34.00
October	34.00	38.00	39.00	3.50	3.17	3.27	16.50	30.36	30.36	29.00	34.00
November	34.00	38.70	39.00	3.50	3.17	3.27	15.00	28.68	28.87	28.50	33.50
December	34.00	38.70	39.00	3.50	3.07	3.17	13.25	26.00	26.00	24.50	28.75
Averages											
1918	33.25	37.88	37.75	3.50	3.08	3.18	15.94	29.77	27.71	28.81	33.71
1917	41.13	44.14	40.38	3.77	3.772	4.275	13.64	30.40	20.05	27.86	34.74
1916	20.25	21.33	19.85	2.31	2.94	2.83	6.98	17.16	13.10	16.68	18.59
1915	14.02	16.10	14.73	1.24	1.48	1.48	5.57	10.27	9.96	10.91	11.73
1914	13.60	15.60	14.46	1.06	1.32	1.34	4.61	8.66	9.70	9.37	10.96
1913	15.95	16.50	16.12	1.43	1.55	1.60	5.36	10.80	10.44	10.90	13.33
1912	15.32	16.77	16.11	1.32	1.42	1.46	6.67	12.54	12.29	12.12	14.19
1911	14.87	16.96	14.80	1.22	1.47	1.50	5.34	11.23	11.08	10.92	12.91
1910	17.10	18.67	16.30	1.45	1.62	1.66	5.50	12.99	13.32	13.43	16.34
1909	17.49	19.50	17.30	1.43	1.50	1.59	6.37	13.76	13.79	14.45	15.82
1908	17.57	20.24	16.76	1.56	1.66	1.82	5.37	12.45	12.69	12.45	14.40
1907	24.50	26.56	24.47	1.78	1.77	1.87	8.78	14.63	17.26	15.08	17.53
1906	20.43	20.72	19.44	1.71	1.68	1.86	8.69	15.62	14.55	14.74	17.15
1905	17.65	17.99	16.66	1.65	1.65	1.78	8.57	16.14	13.50	13.97	15.02
1904	14.37	15.50	15.92	1.41	1.50	1.71	4.72	12.45	10.95	10.72	12.54
1903	19.25	22.13	18.31	1.65	1.72	1.75	7.33	16.07	14.75	15.50	19.04
1902	20.86	23.50	20.10	1.71	1.73	1.75	8.89	19.68	15.03	17.37	23.35
1901	15.38	17.50	14.60	1.58	1.58	1.70	4.20	15.00	11.25	12.84	16.05
1900	19.47	22.00	18.35	1.75	1.75	2.00	6.65	15.00	11.00	12.84	15.50

dent with the later buying there were many allocations to those having war orders, these being invariably cemented by formal contracts, and when the general cancellation of war contracts came, the pig-iron producers held that their contracts were non-cancellable in accordance with tradition.

Throughout the year the distribution of iron was thoroughly regulated, though at first producers were allowed to use judgment as to the essential character of the demand; then the Government took full control, and, aside from allocating, frequently sent letters urging shipments from furnaces which appeared to be dilatory, though usually the iron in question was in transit.

Early in the year, a shortage of pig iron was predicted and feared, but no actual shutdowns for want of iron came to light, although at times a stoppage seemed perilously near because of delayed shipments. Had the war lasted a few months longer, the expected shortage probably would have developed, inasmuch as the semi-steel shell program alone would have called for several hundred thousand tons. With the flood of war cancellations, the problem became one of what many foundries would do with the iron they were committed to take.

Regulation of Scrap

In the course of the year, nearly all items of scrap reached the allowable maximums, and to give the dealers a profit under these circumstances a commission of 3½ per cent was permitted. The railroads, while prices were at maximum levels, in many instances sold direct to consumers. Considerable quantities of scrap were at times shipped from the Chicago territory to districts where there was a scarcity, permission to do this having been granted by the Sub-committee of Scrap Iron and Steel. In Chicago, prior to the armistice, there was much talk of scarcity, but an amazing amount of material appeared when the prospect of a lessened demand came in sight.

The sensitiveness of the old material market was exemplified by the manner in which it weakened with the first peace talk in October. In early November, consumers had become exceedingly conservative, and by the middle of that month the market was at a standstill except for transactions within the trade. Thereupon prices crumbled.

Busy in Unusual Ways at Cincinnati in 1918

BY CHARLES L. SMITH

A cursory glance at the table of prices during 1918 would probably suggest that pig iron and scrap merchants had very little to do during the year on account of Government regulations. The opposite is the case, especially in the beginning of the year and at its wind up.

The very severe winter that commenced in December, 1917, extended well along into February, and railroad traffic was very much disturbed. As a consequence a number of furnaces in different districts were compelled to bank for lack of fuel. Shipments of pig iron produced were also very slow in getting to destination, which caused a let-up in foundry activities. Steel mills in this territory were comparatively not as badly hit because most of them had a quantity of iron on hand that carried them through the critical period.

The traffic departments of all pig iron and coke houses were under a heavy burden during the months of January and February, and it was near the end of March before shipments were moving with any degree of regularity.

In January only a few scattered sales of Southern iron were reported, and most of it was intended for melters in southern Ohio and Indiana, but freight embargoes against shipments north of the Ohio River delayed deliveries far beyond periods stipulated in contracts. In the latter part of January labor troubles in several machine shops and foundries in Hamilton, Ohio, caused a closing down of nearly all foundries in that city.

Extension of Prices

The extension of Government prices for the first quarter brought out some business, and there was also some buying of both Northern and Southern foundry iron for future shipment at the Government's scheduled figures. However, some furnaces inserted in contracts a proviso that if the price fixed should be below the cost of production the furnaces would have the right to cancel the order.

Very few orders for prompt iron were received the first week in February, but a number of contracts for Southern foundry iron were made with Indiana melters for last-half shipment. Some Southern iron was also sold for shipment to Canada.

Railroad embargoes caused trouble all through February, but these were lifted early in March, and this action had a very favorable effect on the market.

Iron long overdue from the South moved forward more promptly, and the only drawback was a scarcity of cars in which to load the material. The car supply in the Hanging Rock district was much better, and furnaces there were able to catch up on shipments. However, production there was reported as being below capacity on account of the shortage in the fuel supply.

High silicon iron produced in the South was in such great demand that there was practically none to be had for prompt shipment. Some contracts for Ohio silvery iron for future shipment were reported, although furnaces in that district seemed disposed to go slowly in taking on much new business for near-by delivery.

In April considerable iron was piled on furnace yards in the South because of the scarcity of cars in which to ship the metal. Production there was also reported as being very much improved. A demand for Southern basic developed early in April, and one contract for 5000 tons for third-quarter shipment was made and another for 15,000 tons for shipment to a near-by smelter during the last half. The scarcity of basic in all districts was a matter of common comment.

The month of May was a comparatively dull one. The Southern Railway, the last week in the month placed an embargo on shipments north of the Ohio River in order to clean up congestion at its different terminals. This embargo was not lifted until the middle of June. While foundry stocks were very low, reports indicated that the furnaces in the South were accumulating metal because it could not be moved promptly.

Allocation Program

The allocation program of the Government became more strict in June, and some furnaces had trouble in securing the return of questionnaires from a number of their customers. In a few instances this caused a hold-up in the forwarding of iron that in some cases was for melters on the essential list. This was soon remedied and very little trouble was experienced later.

The freight advance of 25 per cent went into effect the latter part of June, and while this benefited several producers, especially in Tennessee, Southern producers, as a rule, were somewhat disappointed that they were not granted permission to increase prices for third-quarter shipment.

The distribution of iron at the beginning of July was very rigidly enforced as far as both basic and foundry were concerned, but as most foundries were engaged in essential work no hardship resulted. The increase in the production of basic iron in southern Ohio was phenomenal. Stove makers were reported to have a sufficient tonnage of foundry iron to carry them through the remainder of the year, but they were unable to make any contracts for shipment in the first half of 1919, which somewhat disrupted their selling plans.

Favorable weather conditions helped out the production of iron in the Birmingham and Ironton dis-

tricts during the entire month of September. A large tonnage of ferrosilicon and ferromanganese was disposed of for last-quarter shipment. The lines were more sharply drawn on the shipment of foundry iron to all melters, and in a few cases priority orders had to be ignored in order to supply firms engaged in urgent war work.

Peace rumors that were circulated about the middle of October had a somewhat depressing influence, and almost no one was willing to buy iron for future delivery. This situation lasted until news of the armistice in Europe was received, and the dull period that extended through the month of November resulted. However, a few contracts were made for first-half shipment in 1919, and in most cases the furnaces inserted in these contracts a clause that bound the buyer to take the iron at the last Government fixed price.

A large number of requests to cancel contracts were received, but these were almost universally turned down, and few were accepted, except where extraordinary conditions governed.

Various estimates were made in December as to the tonnage of iron on the books of producers to be shipped in the first half of 1919. As far as the South was concerned, these estimates ranged from 75 to 90 per cent of output for the first six months of the year. In southern Ohio a conservative estimate near the wind up of the year is probably around 85 per cent.

Through the courtesy of a prominent firm we give in the accompanying table the average invoice price of Southern foundry iron, f.o.b. Birmingham, during 1918, based on No. 2 foundry.

Average Invoice Price of Southern Foundry Iron, f.o.b. Birmingham, in 1918

January	$32.25
February	33.15
March	34.40
April	33.90
May	35.05
June	34.60
July	34.85
August	33.65
September	33.60
October	34.20
November	34.25

The Scrap Market

Scrap dealers have had a somewhat difficult time through the entire year. The maximum prices fixed caused some confusion because of the debated question on commissions to be allowed, which took some time to settle. With the exception of No. 1 machinery cast and No. 1 railroad wrought, no scrap for melting purposes reached the maximum figure allowed during the entire year. Relaying rails early in the year were in urgent demand, especially from concerns supplying the sawmills and sugar plantations in the South, but a very small amount of this scrap could be obtained in this immediate territory.

Steel turnings were absorbed by the steel mills almost as fast as produced, but as the freight rate to the Pittsburgh territory had to be deducted the buying price was always below that in other markets.

Soon after the news of the armistice the price of scrap declined, and the average for No. 1 railroad wrought in the month of November was $25.75 and that for No. 1 machinery cast $26.25. A comparison of quotations in January of $29 per net ton for No. 1 railroad wrought and $25 per net ton for No. 1 machinery cast shows how these two grades have varied within the past 11 months.

The accompanying table shows the range of prices at Cincinnati on leading grades of pig iron and scrap, averaged from weekly quotations in THE IRON AGE.

Aggregate Prices of Pig Iron and Scrap at Cincinnati in 1918

	Southern No. 2, Gross Ton	Northern No. 2, Gross Ton	No. 1 Railroad Wrought, Net Ton	No. 1 Machinery Cast, Net Ton
January	$35.90	$34.26	$29.00	$25.00
February	35.90	34.26	29.00	25.00
March	35.90	34.26	29.00	25.00
April	35.90	34.26	28.50	25.00
May	35.90	34.26	28.50	25.00
June	36.02½	34.32	28.75	25.25
July	36.60	34.50	29.00	26.75
August	36.60	34.50	29.25	28.75
September	36.60	34.50	29.50	29.50
October	37.60	35.80	28.75	28.25
November	37.60	35.80	25.75	26.25

Eastern Pennsylvania Iron and Steel Markets in 1918

BY C. E. WRIGHT

Requirements of the United States Government and the Allies for shells, ship steel, car and locomotive building and for construction purposes in this country and behind the lines in France and other miscellaneous war needs completely absorbed steel plant and rolling mill capacity in this district during the year just ended. Usual market factors were, of course, missing because of Government control of production, shipments and prices.

Prices for finished steel throughout the year continued without change except in some minor particulars, these prices being 3.25c., base, for plates, 3c. for structural shapes, 2.90c. for steel bars, 4.25c. for blue annealed sheets, 5c. for black sheets and 6.25c. for galvanized sheets, all Pittsburgh. Common merchant bar iron sold throughout the year at 3.50c., Pittsburgh, but late in the year a price of 4.25c. for bar iron made from selected scrap and a price of 5c. for refined iron bars were established by the American Iron and Steel Institute. Although bar iron has commonly sold in the Philadelphia district on an f.o.b. mill basis, the makers, on account of the unusual conditions prevailing, quite generally made shipments during 1918 on a Pittsburgh basing.

Delivered prices for iron and steel products changed twice during the year, first on account of a general increase in freight rates of 25 per cent in June, and again on Nov. 1 because of an increase in the Pittsburgh-Philadelphia freight rate.

During the early part of the year considerable difficulty was experienced in getting out full tonnage of rolled products because of a shortage of pig iron and steel. Under these difficult conditions production costs went up and there was a great deal of agitation at different times during the year for higher prices, particularly among the class 3 steel makers and others having plants not fully integrated. This agitation, when translated into formal appeals to the War Industries Board, availed nothing.

After the steel manufacturers pledged 100 per cent production for the Government, which was done in April, ordinary commercial requirements dropped further and further into the background, eventually working to a situation wherein none but work essential to the winning of the war was assured supplies of steel.

With the signing of the armistice normal conditions began to make their return to the steel industry, but a free and competitive market had its first real inception with the announcement that the War Industries Board would discontinue control of prices on Dec. 31. Steel makers in this district, especially the smaller producers, did not readily accept the reductions in prices which the general committee of the American Iron and Steel Institute announced on Dec. 11 as suggestions for the trade to follow. At the close of the year, however, it was apparent that few, if any, Eastern mills would lag behind in making the proposed reductions. On account of high production costs, however, some of the mills in this district sought the more profitable export business rather than take on domestic business at the lower levels.

Pig Iron

Pig iron output in eastern Pennsylvania was very much curtailed during the first two or three months of the year by coke shortage. Conditions improved with the coming of spring weather, but shipments of iron had been so far delayed by the railroad congestion of the winter that a very heavy demand for iron made itself felt. During the entire year the great problem with which producers had to contend was to get enough iron to supply essential requirements. Allocations of

iron by the War Industries Board were begun in second quarter, and from then on until Government restrictions were removed, after the signing of the armistice, the furnaces largely followed Government instructions in accepting business and making shipments. The price of basic iron as fixed by the Government was $33 at furnace during first quarter of the year and $32 at furnace during second and third quarters, while eastern Pennsylvania No. 2 X iron was $33.50, furnace, throughout the first nine months of the year. Beginning Oct. 1 furnaces east of the Allegheny mountains and north of the Potomac River were permitted by the War Industries Board to sell iron on an f.o.b. Pittsburgh basis, while furnaces south of the Potomac, including those in Virginia, Tennessee and Alabama, were permitted to sell on a Birmingham basis. This resulted in an increase in the delivered price of eastern Pennsylvania No. 2X iron from $34.40 in September to $38.85 in October. An increase in the freight rate from Pittsburgh to Philadelphia on Nov. 1 from $3.60 to $3.90 caused a further increase in the price of delivered iron, amounting to 30c. a ton. After being permitted to sell on Birmingham base, Virginia iron producers obtained $41.75 a ton for No. 2 X iron, delivered in Philadelphia from Virginia furnaces. The Birmingham and Pittsburgh bases did not apply either to charcoal or low phosphorus iron.

Until the signing of the armistice there was a demand for all the iron that could be made, but the end of the war brought new conditions. Consumers became anxious to cancel, believing that they would not have use for all the iron they had bought, but sellers were very determined that no cancellations be permitted. There had been considerable sales of both steel making and foundry iron for delivery in the first half of 1919, and the usual arrangement as to price was that in the event that Government price control was discontinued the last-named Government price would apply until completion of contract. Even after the signing of the armistice some small lots of foundry iron were sold for shipment in first quarter, with this sort of a price understanding. Eastern Pennsylvania and Virginia furnaces did not accept the recommendation of the general committee of the American Iron and Steel Institute, which was given out for publication Dec. 11, that all pig iron prices be reduced $3 a ton on Jan. 1. At the close of the year Eastern furnaces were still strongly maintaining that high production costs and the well sold up condition of their order books were factors which made it seem both inadvisable and unnecessary to sell iron on a lower price basis. Nevertheless, it seemed certain that the new year would bring reductions of $3 a ton. In fact, the makers of low phosphorus iron had taken such action just before the year ended.

Average prices of eastern Pennsylvania No. 2 X, Virginia No. 2 X, gray forge, basic and standard low phosphorus iron by months, delivered Philadelphia, are given in the accompanying table.

Month	East Pa. No. 2 X	Virginia No. 2 X	Basic	Gray Forge	Standard Low Phos.
January	$34.25	$36.77	$33.75	$32.75	$53.75
February	34.25	36.77	33.75	32.75	53.75
March	34.25	36.77	33.75	32.75	53.75
April	34.25	36.77	32.75	32.75	53.75
May	34.25	36.98	32.75	32.75	53.75
June	34.29	37.60	32.79	32.79	53.79
July	34.40	37.60	32.90	32.90	53.90
August	34.40	37.60	32.90	32.90	53.90
September	34.40	37.60	32.90	32.90	53.90
October	38.85	41.75	36.60	36.60	54.90
November	39.15	41.75	36.90	36.90	54.90
December	39.15	41.75	36.90	36.90	54.90

Government control of old material began on Jan. 1, 1918, and ended shortly before the close of the year. The headquarters of the Sub-Committee on Scrap Iron and Steel of the American Iron and Steel Institute was located in Philadelphia and this market, therefore, in a certain sense became the center of the scrap business for the entire country. During the early part of the year the work of the sub-committee had largely to do with regulations as to prices and grading of scrap, but later, when scrap became scarce, its functions increased to such an extent that just before the signing of the armistice scrap was being allocated to many plants which could not obtain supplies through regular channels. Although some dissatisfaction was bound to exist in regard to rulings of the sub-committee, it may now be said that there is general recognition that its work was most efficiently performed.

The base prices established at the beginning of the year were $30 for No. 1 heavy melting steel, $20 for cast iron borings and machine shop turnings and $35 for No. 1 railroad wrought, per gross ton, delivered at consumers' works. Prices on other grades of scrap were worked out by the American Iron and Steel Institute to conform as nearly as possible to these base prices. On April 1 scrap prices were marked down $1 a ton by order of the War Industries Board, but there were no further changes during the year except in classifications and regulations.

The status of the dealer or broker was definitely established beginning the second quarter of the year, when a commission of 3½ per cent was allowed by the Government to these agents for making purchases for their customers. During the greater part of the year this commission represented in most instances the only profit that the dealer or broker received. On considerable business the dealer was eliminated.

The signing of the armistice on Nov. 11 left the trade in a chaotic condition. Consumers at once began to retrench and there were many cancellations of unfilled tonnages. Scrap prices almost immediately weakened, but, as there were few sales, it became very difficult to quote prices which accurately represented the conditions. By the end of the year, however, No. 1 heavy melting steel had dropped from $29 to a point ranging from $20 to $23, while other grades had declined proportionately. These prices were established largely through trading among dealers, there being no consumer demand to determine the actual strength or weakness of the market. This was the situation at the close of the year. Average prices on low phosphorus scrap and old iron rails, wrought pipe, stove plate and railroad malleable, as compiled from the weekly market reports of THE IRON AGE, appear below, the other classifications being published elsewhere in this issue.

	Low Phos. Steel Scrap No. 1 Grade	Old Iron Rails	Wrought Pipe	Stove Plate	*Railroad Malleable
January	$38.00	$40.00	$32.50	$22.50	$30.00
February	39.37	40.00	33.12	22.85	29.25
March	38.75	40.00	32.50	23.00	29.00
April	39.00	39.00	32.00	23.25	28.00
May	39.00	39.00	33.00	24.00	28.00
June	39.00	39.00	33.00	24.25	28.00
July	39.00	39.00	33.00	25.20	26.40
August	39.00	39.00	33.00	28.00	27.50
September	39.00	39.00	33.00	28.00	29.00
October	39.00	39.00	33.00	28.00	29.00
November	39.00	39.00	33.00	27.12	29.00
December	37.00	36.00	28.50	24.50	29.00

*This quotation represents the price for delivery to steel plants; the same material for malleable works ranged about $2 or $3 higher during the year, the maximum being $34. The December quotation is higher than the material could have been sold for, but in the absence of sales no accurate quotations could be named during that month.

The Sheet and Tin Plate Trades in 1918

BY B. E. V. LUTY

THE sheet and tin plate industries have usually been regarded as cognate, because their processes of rolling are much the same and their raw materials are substantially identical. The uses to which their products are put are, however, very different. The materials are not used by the same classes of trade and in this respect there are really very few points of contact. The war brought this fact out in striking fashion, for under Government regulation the tin plate industry was stimulated in every way possible, while the sheet industry was restricted. As soon, however, as the perishable food crops of the season were taken care of, restrictions were imposed upon the manufacture of tin plate, and a portion of the sheet

bar tonnage thus released fell to the sheet mills, whereby their production increased.

The Production

On account of pressure of war work, the statistical department of the American Iron and Steel Institute has been unable to complete the statistical work for 1917. Only the production of pig iron and of rails in 1917 has been officially reported, and it is therefore impossible to estimate intelligently the production of sheets in the year just closed. In the case of tin plate there are statistics available, compiled from month to month by the tin plate war service committee. They show a tin plate production for the first eight months of 1918 of 23,300,000 base boxes, and if the pressure for production had been continued throughout the year, the output would have been fully 35,000,000 boxes, or about 1,600,000 gross tons, double the production in any year prior to 1912. With the change of conditions, the actual production in the year has been not much in excess of 32,000,000 boxes, or barely as much as in 1917, though still making a very favorable comparison, indeed, with earlier years.

In 1917 the production of sheets was very nearly at capacity, there having been a very heavy commercial demand throughout the major portion of the year, with a very considerable war demand added, while there was very little restriction of output by reason of steel scarcity. In 1918 the condition was quite different. Steel had to be conserved and the production of sheets was confined very largely to the tonnage necessary to supply the strictly war requirements and the more essential of the commercial requirements. There was a large decrease in the actual demand for sheets for many purposes, but the restriction in output, due to steel scarcity, was still greater, so that at any time in the year more sheets could have been sold and delivered than was permissible under the regulations.

Trend of Prices

There were no changes in sheet and tin plate prices during the period of Government control. Prices were set by the War Industries Board Nov. 5, 1917, at $7.75 per base box, 100 lb., for tin plate, and at 4.25c. for 10 gage blue annealed sheets, 5c. for No. 28 gage black sheets and 6.25c. for No. 28 gage galvanized sheets. The revision in prices that occurred the middle of December, looking to the relinquishment of Government control, brought tin plates down $8 a net ton to $7.35, blue annealed sheets down $7 a net ton to 3.90c., black sheets down $6 a net ton to 4.70c. and galvanized sheets down $4 a net ton to 6.05c. For export tin plate, however, the mills seem disposed to quote not less than the old price of $7.75.

During the war all production costs in the iron and steel industry increased markedly, and particularly wage costs, while Government control prices underwent no change. Accordingly, it has been argued by the producers of the more highly finished descriptions of steel products, those involving the greatest employment of labor, that if the original price structure adopted by the Government was a harmonious and properly proportioned one for the conditions existing at the time, the increases in wage costs should make it that in a general reduction in steel prices the more highly finished products should be reduced at least, that the decline should be about the same amount per ton as experiences by the heavy rolled products, rather than that the decline should be figured on a percentage basis of the selling price.

When Government prices were fixed, the 6.25c. price on galvanized sheets was regarded by producers as too low relative to the 5c. price on black sheets. The spread had formerly been from $1 to $1.15 per 100 lb., but with spelter and wages so high the $1.25 spread was regarded as very meager. To an extent this situation has been recognized in the price revision, whereby there is now a spread of $1.35.

Period of High Wages

While the sheet and tin plate mills employ some common labor and also much moderately skilled labor, at hourly or daily rates, their chief labor cost is for men employed at the hot mills on a tonnage basis. The Amalgamated Association controls less than half the mills, but the non-union mills have much the same wage scale, and of late their wages seem to have averaged a trifle above the union scale. The sliding feature of the union scale, depending upon prices realized for the product, is observed in one form or another in the non-union scales.

The union scales for sheets and tin plates are rather complicated, in that while the rates published in the scale book, for the various jobs and gages, appear like base rates, the actual wages decrease below the published rates if the selling prices go low enough, but there are prescribed minimums below which wages cannot go. Bi-monthly there is an adjustment of wages, rates being fixed for the ensuing two months, based on the prices that have been realized on material shipped during the two preceding months, and the announcement is then made that wages are to be such and such a percentage above the base of the scale. This is correct, but at the same time the wages prescribed are a greater percentage than that above the minimum permitted by the scale.

In both sheets and tin plates the highest realized prices shown were for shipments during November and December, 1917, establishing wage rates for January and February, 1918, the settlement prices being 5.50c. for sheets and $8.60 for tin plates. The average prices were above Government limits by reason of the filling of many old orders. Shipments in September and October. 1918, showed 5c. for sheets and $7.85 for tin plate. Sheet mill wages accordingly came down from 100½ per cent above base rates to 85½ per cent above base rates, the scale prescribing 1½ per cent advance for each 5c. per 100 lb. in realized prices above 2.15c., while tin mill wages come down from 102 per cent above base to 87 per cent above base, the scale prescribing 1 per cent advance over base rates for each 5c. per box excess in tin plate prices realized above $3.50 per box.

The scales prescribe, however, that wages shall slide downward, by these same percentages, until 1.80c. is reached on sheets and $3.20 on tin plate. Sheet wages, therefore, find their real minimum at 10½ per cent below base and tin mill wages at 6 per cent below base. Thus the correct comparison for wages paid during November and December, 1918, is that sheet wages were 185½ per cent of base rates, against a possible minimum of 89½ per cent., while tin mill wages 187 per cent, against a possible minimum of 94 per cent. Thus sheet wages were still more than double the minimum, while tin mill wages were practically double.

Market Prospects Favorable

Market prospects for both sheets and tin plates are relatively good. Steel demand as a whole is light when there is little construction work in progress, as promises to be the case until investors find themselves, but sheets and tin plates are so much a matter of daily consumption that they experience good demand when construction work is light. That is particularly the case with tin plate, and it has frequently been remarked that when the steel trade as a whole has a bad year the tin plate mills are likely to have a good year. Their demand runs along much the same, while they are in a particularly good position as to getting supplies of steel and other materials, as well as labor.

There is but one unfavorable feature in the tin plate situation, and that is the stocks of tin plate left over from the canning season. The plans of the Food Administration were well laid and it was desired, as a measure of safety, to provide tin plate for the maximum quantities of the canning crops that could possibly be expected. The plan was carried out, but some of the crops, while heavy, fell short of the maximum possible, whole on account of labor shortage not all the crops could be packed. Thousands of bushels of tomatoes in Maryland and Delaware rotted on the ground because labor could not be had, chiefly because the labor was employed in munition factories and other war work. For the conservation of tin plate, the mills had advised many of their customers to experiment

with fiber or composite containers, and it is difficult to make them instantly forget these ideas. Prospects are for a very heavy pack of all foodstuffs in 1919, while there is an insistent export demand and the general line tin plate consumers are likely to be very busy.

A heavy export demand in sheets is certainly to be expected, as this trade existed before the war and requires only shipping facilities for its resumption. The sheet trade still has its domestic customers, who were given war work of much the same character as normally engaged them, and the shift from war-time production to ordinary commercial production is a simple one.

One of the largest customers of the sheet trade is the automobile industry, which upon the termination of the war did not delay in making its attitude known. It desired the heaviest and quickest deliveries of sheets possible to compass, with practically no questions asked as to prices.

Non-Ferrous Markets Uneventful in 1918

BY EDWIN F. CONE

After twelve months of practically a controlled market the non-ferrous industry enters the new year almost entirely free from control but with the future more uncertain than in almost any previous year. After a domination by virtually only one consumer, the Government, the industry finds itself in most cases with large stocks or output and with almost no immediate buyer. Copper was under strict regulation as to price and distribution throughout 1918. Lead prices were fixed by agreement among producers about the middle of the year with sale and distribution thereafter under the control of a producers' committee until Dec. 21. Tin was the last metal to be controlled and was still under regulation as the new year began, the entire market being in an extremely unsettled state. Spelter, in the lower grades, escaped all Government regulation throughout the war; only Grade A came under a maximum price. The antimony market was uneventful. Prices of all metals attained no unusual heights except tin, which made a record.

Copper Output Pushed to the Limit

Placed under Government control in September, 1917, the copper market continued under regulation until the close of 1918. The one thought in the mind of the trade throughout the year was the production of the largest possible amount of both crude and refined copper. This was assured the Government, which in turn granted what was considered a sufficiently high price to stimulate output and enable the high-cost small producers to contribute their share.

Consumption of copper up to the signing of the armistice was of tremendous proportions. Production also was very large, estimates placing it at about 2,000,000,000 lb. for 1918, as contrasted with about 1,000,000,000 lb. per year not long before the war. As a result of this large output and the sudden falling off in war demand, the industry found itself confronted late in December with an estimated visible supply running anywhere from 400,000,000 to 800,000,000 lb.

The leading and only interesting feature of the 1918 market was the Government's price-fixing policy. The year opened with a maximum price of 23.50c. per pound as the Government level for both Lake and electrolytic copper. In January this price was reaffirmed until June 1. As May approached discussion centered on the necessity of a higher price because of advancing costs at both smelters and refineries. At a meeting of the price-fixing committee of the War Industries Board and of the producers late in May the 23.50c. price was reaffirmed from June 1 to Aug. 15. The brevity of the extension period led many to think that an advance was likely at the end of this time, for the conviction that an advance would be granted on June 1 had been so strong that disappointment was keen.

Quite unexpectedly the meeting, scheduled for Aug. 7 to consider a price to prevail after Aug. 15, was advanced to July 2, at which an increase of 2½c. per lb. was ordered effective at once, placing the maximum price at 26c. until Nov. 1. This price was unchanged thereafter and was maintained officially until Jan. 1, 1919. It can be said that producers and miners, refiners and workmen all labored patriotically throughout the year to maintain output. Serious and unprecedented winter weather in January and February retarded production, as did also the influenza epidemic in October. Having supported the Government in its need, the industry at the close of the year secured the assurance of the Government that none of its large stocks of metal would be thrown on the market suddenly so as to unduly disturb values. While the official price was maintained until the close of the year, rumors were current late in December that resale electrolytic copper had been offered as low as 23c. per lb. Buying, however, was practically negligible as the year ended with consumers generally expecting lower levels.

Two events characterized the closing weeks of the year. It was officially decided that the copper market would be an open one after Jan. 1, with conjecture rife as to what the new price level would be. The other event was the official announcement of the formation of a combination of copper producers to control the export trade. The new company is known as the Copper Export Association with John D. Ryan at the head.

Copper imports are believed to have been of record proportions in 1918. Estimates place them at 566,720,000 lb., as against 555,000,000 lb. in 1917. Exports did not make a record in 1918 according to estimates. They were probably about 694,000,000 lb., which are exceeded by those of 1917, 1916 and 1914, but which are larger than those of 1915.

In the last week of the year appeared the statement of a fixed price for export of 23c. per lb. The uppermost thought in the trade as the year closed was whether this fixed price would bring export buying and stabilize the domestic market.

Tin the Only Sensational Market

By far the most important and sensational market of 1918 was that for tin. The market reached the highest price levels ever known, both for spot and future shipment. Late in May the spot market had reached a nominal value of $1.03 per lb. New York, but this represented only occasional sales of small lots and no broad market, the metal being almost unobtainable. Even as high as $1.10 per lb. was reported having been realized and $1.25 offered in some localities. At the beginning of the year the price was 85 to 86c. New York. The future shipment market also constantly advanced until it reached the unprecedented level of 97 to 98c. per lb. early in May for May, June and July shipment. The reason for the latter high market was principally a lack of sellers, with other causes entering into the situation. It was extremely difficult for sellers to do business, so late were all cables and so complicated the restrictions of import, export and railroad embargo conditions, and particularly because of the lack of offerings from England. For the first time in many years or perhaps in the history of the market, no price was obtainable about March 13 on Straits tin for any position. From this time on the market became very quiet and continued so to the close of the year. This was true late in the year because of the international control of the market, which became effective about that time.

The most important event in the tin market of 1918 was the subjection of it to national and international control. About the middle of August, John Hughes, chairman of the sub-committee on tin of the American Iron and Steel Institute, and George Armsby, chief of the tin section of the War Industries Board, went to England to confer with British tin experts on the

international tin situation. Not much has been made public regarding what transpired. The result was that an International Tin Executive was appointed to sit in London who should arrange for all purchases of tin for all the Allies and allot the supply to each one. This constituted international control. So far as the United States was concerned all metal allocated by the Tin Executive to this country was consigned to the United States Steel Products Co., which is the only organization to which import licenses for tin can be granted. Consumers desiring tin can obtain it by securing a license from the American Iron and Steel Institute, which grants the purchaser his tin. This control of the market shuts out all business by importers, the United States Steel Products Co. being the only importer permitted a tin license. The tin so allocated and sold to the United States consumers is distributed at cost, or at 72.50c. per lb. New York and Chicago, at 71.25c. per lb. Pacific ports. The putting into effect of such a controlled market was not really consummated until late in October, so that a tin-controlled market really came at the end of the war.

The tin importers, shut out from their usual business, formed a Tin Importers Association which passed resolutions which it presented to the War Industries Board citing the new arrangement as a virtual monopoly, since the only importer of tin is the largest consumer also. As the year closed there were indications that the control of the market would continue until the 8000 to 10,000 tons, allocated to the United States Steel Products Co., was disposed of, though this was expected to be a slow process, stocks of tin in consumers' hands being already large. There was some possibility, however, whereby an ending of this control and a return to normal trade conditions might result early in the new year.

While the market in the larger sense was a fixed one as to price at 72.50c. New York, there was what one might term an "outside" market which consisted in December of resale metal which was obtainable at about 72c. New York. Demand however was extremely light as the year ended.

An interesting phase of the statistical side of the tin industry is that tin imports or the monthly average of tin deliveries in 1918 had exceeded all previous years up to Oct. 1. Imports from Jan. 1 to Oct. 1 had been 47,428 gross tons, against 44,837 tons in the same period in 1917. In 1913 the monthly average of tin deliveries was 3658 tons per month; in 1917 it was 4823 tons per month, while to Oct. 1, 1918, it had been 5270 tons per month.

Lead Finally Placed Under Control

At no time during 1918 did the lead market present any sensational features, price changes having been orderly and within a narrow range until the situation was taken under control. The lowest price level of the year prevailed at the opening, with the metal for early delivery quoted at 6.55c. per lb., St. Louis. From that time until the middle of June it gradually rose, with one or two recessions, until it reached 7.75c. per lb. St. Louis. The demands of the Government gradually increased as the year advanced until a decided scarcity developed in July and August, by which time a runaway market was feared.

During all this period a general committee of the lead producers was assuming control of the situation. This was a voluntary organization. By the middle of the year this committee had taken over practical control of the market and had fixed among themselves a maximum price for lead at 7.75c. per lb. St. Louis, or 8.05c. New York. This prevented the threatened wild market and the cornering of lead by speculators as well as the actual taking over of the industry by the Government. This situation was being handled so well as events progressed that the War Industries Board finally asked the Lead Producers Committee to assume official control. Until some time after the armistice was signed in November all distribution of lead to consumers was completely in the hands of this committee, Government needs having the first attention and all sales being made at the agreed fixed price.

Not until early in December was there any effect noticeable from a cessation of hostilities. At that time the Lead Producers Committee announced a reduction in the agreed price of 1c. per lb. to 6.75c. St. Louis. It is believed that the war scarcity of lead had developed by this time into an ample supply, due largely to cancellations and that the drastic cut was due to this fact. The lower level did not stimulate buying. The official price was held at this point until Dec. 21, when the committee announced that the market would be an open one from that day with producers free to sell as desired and with no restrictions as to resales. The next day came the old familiar announcement of a price at which the American Smelting & Refining Co. would do business or the inauguration of a Trust price and an outside market. The new price was 6.20c. St. Louis or 6.50c. New York. On Dec. 27, the same company again lowered its price to 6c. New York or 5.70c. St. Louis. Realizing that the supply largely exceeded demand as the year ended, lead producers were curtailing production wherever possible.

Spelter Practically a Free War Market

The spelter market, as judged by the dealings in prime Western or Grade C in 1918, was a quiet and orderly one. Market values experienced no sensational swings, their rise and fall being slight, caused largely by the entrance into the market of the Government for either Grades A or C, which was of course the largest customer during the war. The year opened with prime Western quoted at 7.62½c. per lb. St. Louis for early delivery. This level sagged to 6.62½c. late in April, which was the low point of the year. From this time the market gradually rose, with brief periods of slight recessions until it reached 9.50c. on Sept. 18, the highest level of the year. It was during this period that some of the heaviest buying by the Government took place. Until the armistice was signed in November the market gradually receded from this high point to about 8.40c. St. Louis. For the rest of the year the market changed but slightly, the closing quotation being around 8c. St. Louis for prompt, there having been late in November and early in December quite a little buying by galvanizers, an industry largely neglected during the war.

The zinc industry was the only major one of this group which was not regulated by the Government, except as to one special grade. Late in February came the announcement that a maximum price of 12c. per lb. had been placed on Grade A zinc, effective until June 1. Later this price was continued for the rest of the year, when late in December all restrictions were removed effective after Jan. 1. It is interesting to note that while a maximum price existed in this higher grade of zinc it is understood that all sales made to the Government, the principal buyer, were under this level.

At the same time the announcement of a fixed price on Grade A zinc appeared, one placing a maximum price of 15c. per lb. on sheet zinc and of 14c. per lb. on plate zinc. These were effective until Dec. 31, after which an open market was to prevail.

An interesting development in this market in 1918 was the appearance in August of weekly reports by the Government of stocks and output showing concisely the state of the industry as to each grade of metal.

Exports of zinc by no means attained the proportions in 1918 that they had in previous years. To Sept. 1, 1918, the total had been only 110,698,529 lb., as contrasted with 273,101,566 lb. to Sept. 1, 1917, and 221,746,412 lb. to Sept. 1, 1916. France was the largest customer with the United Kingdom and Italy next. The falling off was due mostly to larger supplies in Great Britain probably from her own smelters.

Antimony a Quiet Market

The antimony market was very quiet during the entire year, with no particular features of interest. Price fluctuations were orderly with no sensational rise as in 1916 and 1917. Until November values fluctuated between 13c. and 14.50c., duty paid, New York, for wholesale lots for prompt shipment, when with the ending of hostilities the market fell to 10.50c. and then to about 8c. to 8.50c. It closed the year with demand light and the future uncertain.

Iron and Steel Prices for Twenty-One Years

Monthly Averages Computed from the Weekly Market Quotations of "The Iron Age" in the Period 1898-1918

(With Supplement)

Accompanying this issue of THE IRON AGE is our annual chart, in which lines are plotted to indicate the course of prices for pig iron, Bessemer steel billets and some leading forms of finished iron and steel in the 21 years ended with 1918. The diagrams are based on monthly averages of prices quoted week by week in our market reports from the leading selling centers. The table below, which gives the monthly average prices on which the chart is based includes also the average prices of No. 2 X foundry pig iron at Philadelphia, which have not been put in graphic form.

Bessemer Pig Iron at Pittsburgh, Dollars per Gross Ton (2240 lb.)

	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
Jan.	9.87	10.87	24.99	13.15	16.70	22.15	13.91	16.85	18.35	23.15	19.00	17.34	19.90	15.90	15.05	18.15	14.96	14.59	21.58	35.95	37.25
Feb.	10.05	11.60	24.80	14.43	16.93	21.45	13.66	16.41	18.35	22.85	17.90	16.78	19.34	15 90	14.90	18.15	15.09	14.55	21.51	35.95	37.25
March	10.39	14.59	24.72	16.31	17.37	21.85	14.25	16.35	18.28	22.85	17.86	16.25	18.60	15.90	15.09	18.15	15.09	14.55	21.75	27.70	37.25
April	10.41	15.03	24.70	16.75	18.75	21.28	14.18	16.35	18.19	23.35	17.49	15.78	18.27	15.90	15.15	17.90	14.90	14.55	21.95	42.20	36.15
May	10.30	16.20	21.00	16.30	20.75	20.01	13.60	16.16	18.10	24.01	16.93	15.84	17.52	15.90	15.13	17.70	14.90	14.59	21.95	45.15	36.15
June	10.34	18.51	19.72	16.00	21.56	19.72	12.81	16.65	18.23	24.27	16.90	16.05	16.60	16.90	15.15	17.14	14.90	14.70	21.95	54.70	36.38
July	10.25	20.65	16.75	16.00	21.60	18.89	12.40	14.85	18.41	23.55	16.83	16.46	16.40	15.90	15.20	16.70	14.90	14.95	21.95	57.45	36.60
Aug.	10.35	21.75	15.60	15.75	21.62	18.35	12.81	15.20	19.00	22.90	16.23	17.03	16.09	15.90	15.46	16.52	14 90	15.95	21.95	54.75	36.60
Sept.	10.78	23.43	13.87	15.75	21.75	17.22	12.63	15.91	19.54	22.90	15.90	18.05	15.90	15.90	16.15	16.65	14.90	16.85	22.26	48.03	36.60
Oct.	10.36	24.18	13 06	15.89	21.75	16.05	13.10	16.54	20.35	22.00	15.71	19.53	15.90	15.44	17.80	16.60	14.84	16.95	24.08	37.25	36.60
Nov.	10 15	24.78	13.48	16.00	21.68	15.18	14.85	17.85	22.85	20.65	16.59	19.90	15.82	15.00	18.02	16.02	14.59	17.51	30.15	37.25	36.60
Dec.	10.58	24.90	13.43	16.31	21.75	14.40	16.65	18.35	23.75	19.34	17.40	19.90	15.90	15.03	18.15	15.77	14.70	19.65	35.68	37.25	36.60

Bessemer Steel Billets at Pittsburgh, Dollars per Gross Ton

Jan.	14 93	16.62	34.50	19.75	27.50	29.60	23.00	22.75	26.25	29.40	28.00	25.00	27.50	23.00	20.00	28.30	20.13	19.25	32.00	63.00	47.50
Feb.	15.06	18.00	34.87	20.31	29.37	29.87	23.00	23.50	26.50	29.50	28.00	25.00	27.50	23.00	20.00	28.50	21.00	19.50	33.50	65.00	47.50
March	15.25	24.30	33.00	22.88	31.25	30.62	23.00	24.00	26.70	29.00	28.00	23.00	27.50	23.00	19.75	28.50	21.00	19.70	42.40	66.25	47.50
April	15.06	25.37	32.00	24.00	31.50	30.25	23.00	24.00	27.00	30.12	28.00	23.00	26.75	23.00	20.00	28.50	20.80	20.00	45.00	73.75	47.50
May	14.85	26.75	28.90	24.00	32.20	30.37	23.00	23.50	26.40	30.30	28.00	23.00	26.12	22.60	20.80	27.37	20.00	20.00	45.00	86.00	47.50
June	14.65	30.10	27.25	24.38	32.37	28.87	23.00	22.00	26.63	29.62	25.75	23.00	25.30	21.00	20.87	26.50	19 50	20.50	43.50	98.75	47.50
July	14.50	33.12	21.00	24.00	31.75	27.60	23.00	22.00	27.25	30.00	25.00	23.50	25.00	21.00	21.50	26.60	19.00	21.38	41.00	100.00	47.50
Aug.	15.85	35.40	18.20	24.20	31.06	27.00	23.00	24.00	27.80	29.25	25.00	24.13	24.62	21.00	22.12	26.00	20.25	23.13	44.20	86.00	47.50
Sept.	16.00	38.87	16.93	24.88	29.50	27.00	20.00	25.00	28.00	29.37	25.00	25.00	24.40	20.75	23.62	24.87	21.00	24.10	45.00	66.25	47.50
Oct.	15.56	38.75	16.50	26.70	29.70	27.00	19.50	25.62	28.00	28.20	25.00	26.25	23.75	20.00	26.00	23.30	20.00	24.63	46.25	49.38	47.50
Nov.	15.06	36.50	18.95	27.00	28.50	24.00	20.25	26.00	28.88	28.00	25.00	27.13	23.30	19.50	27.00	21.00	19.25	26.50	52.00	47.50	47.50
Dec.	15.80	33.75	19.75	27.50	29.12	23.00	21.26	26.00	29.50	28.00	25.00	27.50	23.00	19.25	27.90	20.00	19.00	30.60	57.50	47.50	45.50

Basic Pig Iron, f.o.b. Mahoning or Shenango Valley Furnace, Dollars per Gross Ton

Jan.	.....	.....	.....	.....	.....	.....	.....	.....	15.46	17.06	21.90	16.90	15.50	16.87	13.25	12.35	16.41	12.50	12.50	17.81	30.00	33.00
Feb.	.....	.....	.....	.....	.....	.....	.....	.....	15.25	16.82	22.00	15.97	15.12	16.31	13.65	12.25	16.30	13.19	12.50	17.69	30.00	33.00
March	.....	.....	.....	.....	.....	.....	.....	.....	15.55	16.85	21.50	15.62	14.94	16.00	13.75	12.81	16.11	13.00	12.50	18.20	32.25	33.00
April	.....	.....	.....	.....	.....	.....	.....	.....	15.06	16.88	21.50	15.25	14.05	15.94	13.75	13.00	15.87	13.00	12.50	18.13	38.75	32.00
May	.....	.....	.....	.....	.....	.....	.....	.....	15.06	17.00	22.90	14.91	14.12	15 19	13.32	13.00	15.15	13.00	12.50	18.00	41.60	32.00
June	.....	.....	.....	.....	.....	.....	.....	11.76	14.60	16.94	22.40	15.25	14.62	14.70	13.05	13.12	14.50	13.00	12.59	18.00	48.75	32.00
July	.....	.....	.....	.....	.....	.....	.....	11.20	14.00	17.12	21.75	14.51	15.05	14.50	13.12	13.40	14.37	13.00	12.74	18.00	52.50	32.00
Aug.	.....	.....	.....	.....	.....	.....	.....	11.69	14.32	17.70	21.25	14.69	15.25	14.12	13.00	13.94	14.06	13.00	14.06	18.00	51.20	32.00
Sept.	.....	.....	.....	.....	.....	.....	.....	11.60	14.86	18.44	20.06	14.43	15.90	13.70	12.80	13.47	14.00	13.00	14.75	18.31	42.75	32.00
Oct.	.....	.....	.....	.....	.....	.....	.....	12.19	15.25	19.55	19.50	14.04	16.94	13.15	12.52	15.98	13.90	12.81	15.00	19.88	33.00	33.00
Nov.	.....	.....	.....	.....	.....	.....	.....	14.00	16.87	21.37	18.12	14.72	17.25	13.25	12.42	16.37	13.09	12.48	15.75	25.10	33.00	33.00
Dec.	.....	.....	.....	.....	.....	.....	.....	15.70	16.75	21.50	17.50	15.60	17.05	13.40	12.25	16.50	12.71	12.50	17.50	30.00	33.00	33.00

Southern No. 2 Foundry Pig Iron at Cincinnati, Dollars per Gross Ton

an.	9.50	10.31	20.69	13.45	14.55	21.65	12.37	16.25	16.75	26.00	16.15	16.25	17.25	14.25	13.25	16.95	13.88	12.40	17.90	26.10	35.90
Feb.	9.25	11.69	20.50	13.12	14.75	21.50	12.12	16.25	16.75	26.00	15.75	16.13	17.06	14.25	13.31	16.69	13.81	12.40	17.90	27.53	35.90
March	9.25	13.75	20.30	14.00	14.75	21.37	12.10	16.25	16.65	26.00	15.50	15.05	16.30	14.25	13.50	16.31	14.00	12.27	17.90	31.90	35.90
April	9.25	14.50	20.19	14.50	16.87	20.15	12.50	16.25	16.63	25.06	15.20	14.25	15.37	14.25	13.75	15.65	13.75	12.34	17.90	37.40	35.90
May	9.37	14.56	19.75	13.85	18.35	18.87	12.25	15.81	16.75	24.25	14.75	14.50	15.00	13.95	14.15	14.94	13.75	12.40	17.90	41.90	35.90
June	9.30	16.00	18.75	13.37	20.19	17.75	11.80	14.65	16.44	24.10	15.25	14.70	14.85	13.44	14.25	14.06	13.63	12.50	17.34	45.15	36.08
July	9.25	17.56	16.81	13.00	20.75	16.15	11.81	13.94	16.06	23.85	15.00	15.75	14.75	13.25	14.70	13.75	13.30	12.71	16.90	49.90	36.60
Aug.	9.37	18.35	14.25	13.00	23.06	15.19	12.00	14.40	17.30	23.00	15.25	16.38	14.31	13.45	15.06	14.06	13.25	13.71	16.70	49.90	36.60
Sept.	9.55	19.94	13.62	13.06	25.00	14.75	12.00	14.37	18.69	21.50	15.65	17.35	14.25	13.31	15.87	14.25	13.25	14.15	17.28	49.90	36.60
Oct.	9.75	20.75	12.87	13.75	25.65	13.50	12.81	15.31	20.00	20.95	15.75	17.88	14.25	13.25	16.80	14.35	12.90	14.78	18.03	49.38	37.60
Nov.	9.75	20.75	12.65	14.00	23.62	12.00	15.19	16.60	23.38	19.50	16.00	17.75	14.25	13.20	17.25	13.87	12.90	16.15	22.40	35.90	37.60
Dec.	9.90	20.75	13.75	14.25	22.44	12.05	15.85	16.75	25.00	17.00	16.25	17.45	14.25	13.19	17.25	13.95	12.50	17.10	25.90	35.90	37.60

Local No. 2 Foundry Pig Iron at Chicago (at Furnace), Dollars per Gross Ton

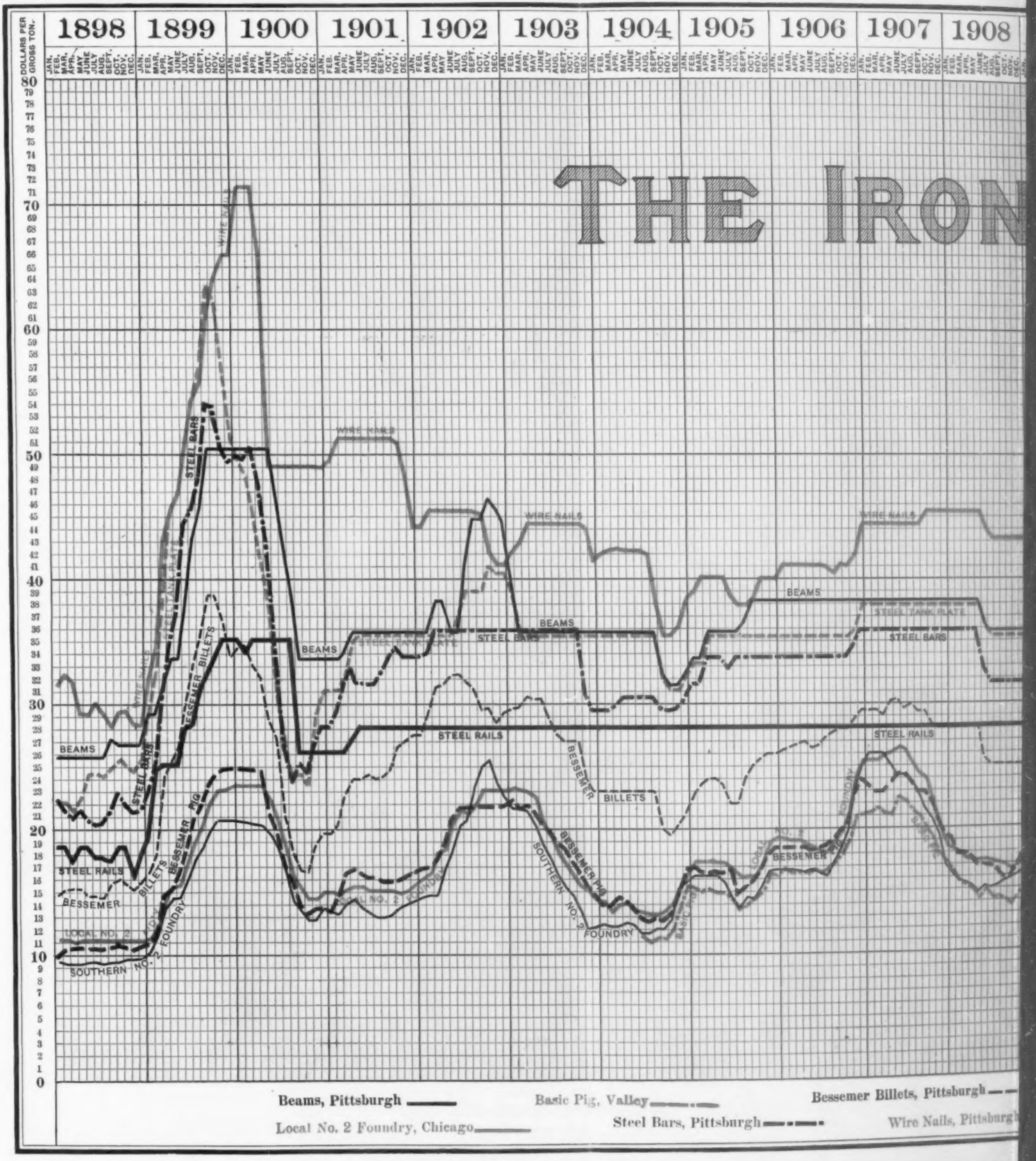
Jan.	11.35	11.47	23.85	15.10	16.25	23.45	14.47	17.85	19.60	25.85	18.45	17.35	19.00	15.50	14.00	17.90	13.75	13.00	18.50	30.00	33.00
Feb.	11.28	12.47	23.85	14.60	16.85	23.35	13.91	17.85	19.41	25.85	18.16	16.75	19.00	15.50	14.00	17.31	14.00	13.00	18.50	32.00	33.00
March	11.10	14.95	23.85	15.60	18.51	23.22	14.05	17.80	19.35	26.10	17.85	16.50	18.30	15.50	14.00	17.25	14.25	12.95	18.70	36.00	33.00
April	11.26	15.47	23.72	15.85	18.97	22.87	14.35	17.60	19.10	26.35	17.73	16.50	17.50	15.00	14.00	17.00	14.25	13.00	19.00	39.25	33.00
May	11.35	15.72	22.65	15.85	20.85	20.72	13.85	17.60	18.90	26.85	17.63	16.50	17.06	15.00	14.50	16.00	14.06	13.00	19.00	43.80	33.00
June	11.35	17.95	20.72	15.35	21.85	19.85	13.70	17.00	18.54	26.60	17.73	16.50	16.75	15.00	14.50	15.62	13.69	13.00	19.00	51.00	33.00
July	11.35	19.22	18.60	15.35	21.60	18.25	13.60	16.47	18.60	25.55	17.55	17.00	16.56	14.87	14.70	14.70	13.75	13.00	19.00	55.00	33.00
Aug.	11.35	20.65	16.25	15.35	22.10	17.22	13.60	16.60	19.45	24.85	17.35	17.13	16.50	14.50	15.37	15.00	13.69	13.44	18.40	55.00	33.00
Sept.	11.35	22.22	15.35	15.35	23.35	16.41	13.85	16.60	20.16	24.10	17.05	18.70	16.40	14.50	16.00	15.00	13.25	13.90	18.13	54.67	33.00
Oct.	11.35	23.35	14.85	15.10	23.35	15.70	14.10	17.66	21.48	22.45	16.85	19.00	16.06	14.46	17.00	15.00	12.94	14.63	19.63	33.00	34.00
Nov.	11.35	23.45	14.85	15.23	23.35	15.10	15.98	19.15	24.70	20.66	17.10	19.00	16.00	14.09	17.75	14.87	12.56	17.13	25.80	33.00	34.00
Dec.	11.35	23.85	15.10	15.85	23.35	14.81	16.95	19.60	25.85	18.80	17.35	19.00	16.00	14.00	18.00	14.60	13.00	18.10	29.50	33.00	34.00

Standard Brands Eastern Pennsylvania No. 2 X Foundry Pig Iron at Philadelphia, Dollars per Gross Ton

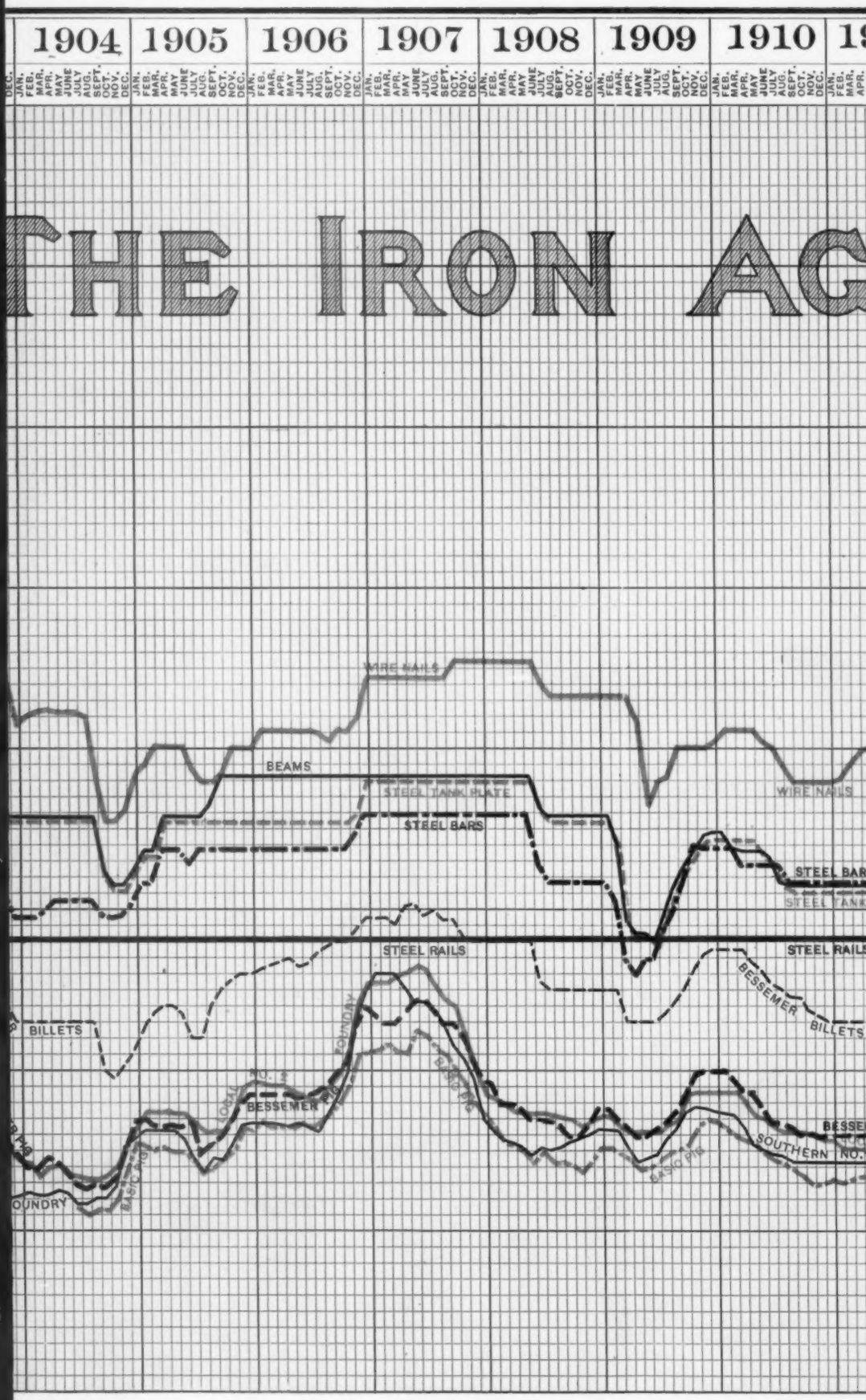
Jan.	10.87	11.44	22.70	15.50	16.75	22.45	14.69	17.50	18.50	24.80	18.25	17.25	19.00	15.50	14.85	18.25	14.65	14.25	19.94	30.10	34.25
Feb.	10.75	11.06	22.56	15.31	17.19	22.25	14.50	17.50	18.50	25.87	18.25	17.00	18.69	15.50	14.85	18.25	14.94	14.25	20.00	31.88	34.25
March	10.55	14.70	22.31	15.12	18.81	22.25	14.80	17.56	18.35	25.00	18.12	16.37	18.00	15.50	14.92	17.77	15.00	14.25	20.05	31.90	34.25
April	10.50	15.75	21.75	15.46	19.62	21.87	15.00	17.75	18.44	24.81	17.65	16.20	17.75	15.50	15.00	17.40	15.00	14.25	20.50	41.38	34.25
May	10.50	15.81	20.60	15.19	19.75	20.06	14.75	17.81	18.50	25.55	16.94	16.06	17.00	15.50	15.18	16.75	14.81	14.25	20.50	43.60	34.25
June	10.50	17.25	18.75	15.06	20.94	19.19	14.50	16.75	18.44	24.62	16.62	16.42	16.55	15.25	15.31	16.19	14.75	14.25	19.94	48.19	34.29
July	10.00	19.44	16.37	15.00	22.30	18.10	14.31	16.12	18.25	23.06	16.50	16.56	16.25	15.00	15.70	15.60	14.75	14.31	19.75	53.13	34.40
Aug.	10.30	20.65	16.15	14.97	22.00	16.87	14.25	16.25	19.00	21.90	16.50	17.00	16.00	15.00	15.87	15.60	14.75	14.94	19.55	53.00	34.40
Sept.	10.75	22.75	15.56	14.80	22.00	16.12	14.25	16.43	20.44	20.50	16.62	18.05	16.00	15.00	16.59	15.83	14.75	16.00	19.50	51.67	34.40
Oct.	10.75	22.75	15.00	15.25	22.12	15.20	14.43	17.25	21.12	19.85	16.75	18.69	15.81	15.00	17.60	15.95	14.63	16.25	20.31	34.25	38.85
Nov.	10.87	23.40	15.35	15.37	23.37	15.00	15.75	18.05	23.30	18.94	17.00	19.00	15.68	14.95	18.25	15.56	14.50	17.12	24.90	34.25	39.15
Dec.	11.06	23.25	15.62	15.75	23.00	15.00	16.90	18.25	24.00	18.84	17.25	19.00	15.50	14.85	18.25	15.30	14.25	19.05	29.25	34.25	39.15

Soft Steel Bars at Pittsburgh, in Cents per Pound

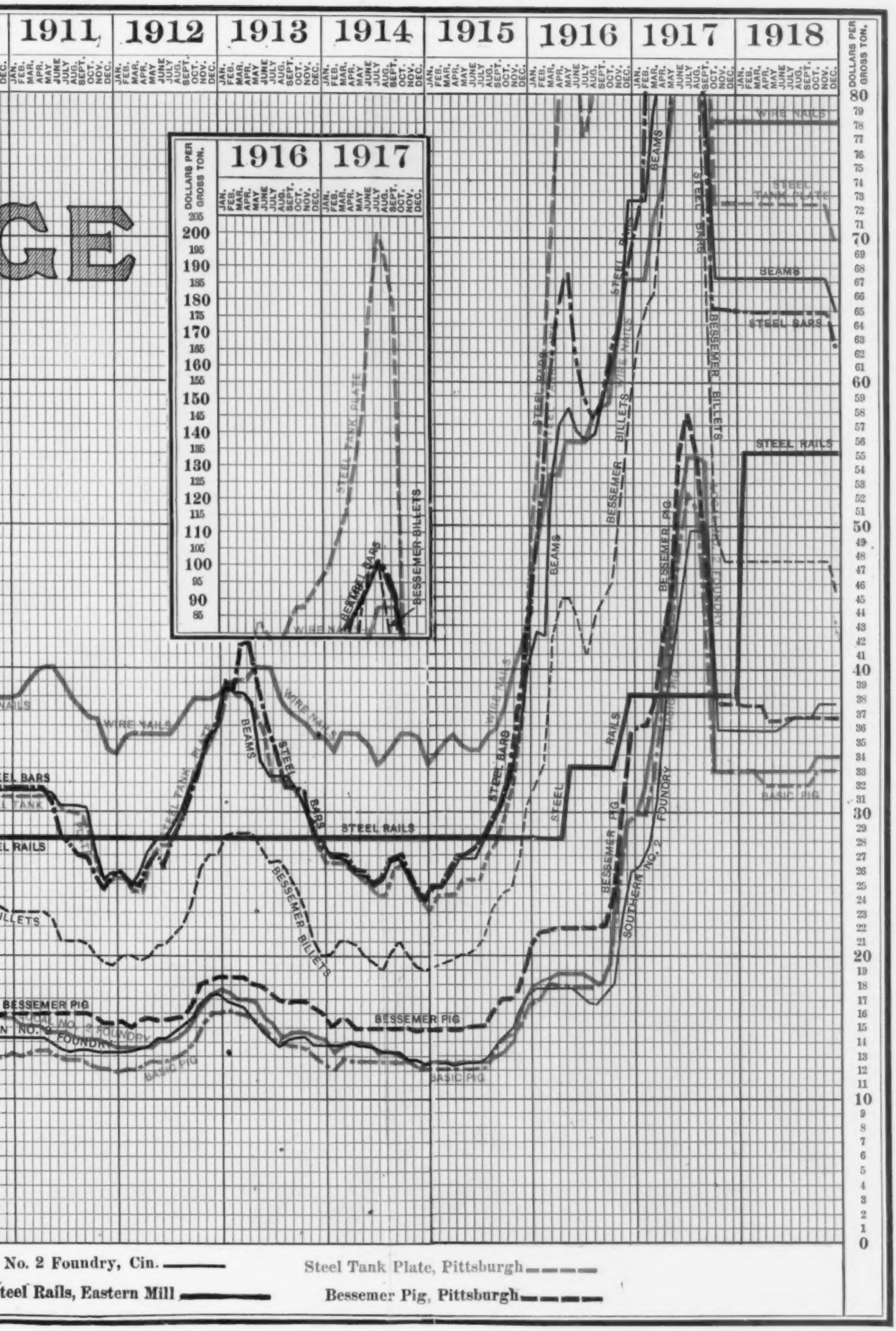
Jan.	0.99	1.02	2.23	1.25	1.50	1.60	1.30	1.40	1.50	1.60	1.60	1.40	1.50	1.40	1.15	1.70	1.20	1.10	2.03	3.15	2.90
Feb.	0.95	1.12	2.21	1.30	1.51	1.60	1.30	1.40	1.50	1.60	1.60	1.35	1.50	1.40	1.12	1.70	1.20	1.10	2.31	3.25	2.90
March	0.93	1.36	2.25	1.40	1.60	1.60	1.33	1.50	1.50	1.60	1.60	1.20	1.45	1.40	1.10	1.85	1.20	1.15	2.65	3.63	2.90
April	0.95	1.56	2.10	1.47	1.60	1.60	1.35	1.50	1.50	1.60	1.60	1.15	1.45	1.40	1.16	1.84	1.15	1.20	2.88	3.75	2.90
May	0.92	1.67	1.91	1.41	1.60	1.60	1.35	1.50	1.50	1.60	1.60	1.19	1.45	1.37	1.20	1.70	1.14	1.20	3.00	4.00	2.90
June	0.90	1.98	1.52	1.40	1.60	1.60	1.35	1.46	1.50	1.60	1.45	1.20	1.45	1.25	1.20	1.60	1.11	1.21	2.75	4.25	2.90
July	0.91	2.02	1.19	1.40	1.60	1.60	1.35	1.50	1.50	1.60	1.40	1.27	1.45	1.23	1.25	1.50	1.12	1.25	2.63	4.50	2.90
Aug.	0.94	2.14	1.05	1.44	1.60	1.60	1.35	1.50	1.50	1.60	1.40	1.32	1.40	1.20	1.30	1.40	1.19	1.30	2.56	4.30	2.90
Sept.	1.02	2.40	1.12	1.50	1.60	1.60	1.31	1.50	1.50	1.60	1.40	1.39	1.40	1.19	1.37	1.40	1.20	1.34	2.60	4.00	2.90
Oct.	0.97	2.39	1.09	1.53	1.60	1.60	1.30	1.50	1.50	1.60	1.40	1.51	1.40	1.12	1.45	1.39	1.15	1.44	2.75	2.90	2.90
Nov.	0.94	2.24	1.18	1.50	1.60	1.37	1.31	1.50	1.54	1.60	1.40	1.50	1.40	1.08	1.55	1.29	1.10	1.62	2.83	2.90	2.90
Dec.	0.95	2.20	1.25	1.50	1.60	1.30	1.34	1.50	1.60	1.60	1.40	1.50	1.40	1.12	1.60	1.21	1.07	1.84	3.00	2.90	2.80



Fluctuations in the Prices of Crude and Finished Iron and Ste



Crude and Finished Iron and Steel from Janua



uary 1, 1898, to January 1, 1919—Gross Tons

Tank Plates at Pittsburgh, in Cents per Pound

	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
Jan.	1.00	1.30	2.22	1.40	1.60	1.75	1.60	1.50	1.60	1.70	1.70	1.60	1.55	1.40	1.15	1.75	1.20	1.10	2.25	4.45	3.25
Feb.	1.00	1.47	2.17	1.40	1.60	1.60	1.60	1.50	1.60	1.70	1.70	1.52	1.55	1.40	1.11	1.71	1.20	1.10	2.56	4.88	3.25
March	0.97	1.75	2.03	1.47	1.60	1.60	1.60	1.60	1.60	1.70	1.70	1.30	1.55	1.40	1.12	1.70	1.18	1.10	3.10	5.25	3.25
April	1.02	2.05	1.87	1.57	1.60	1.60	1.60	1.60	1.60	1.70	1.70	1.27	1.55	1.40	1.21	1.68	1.15	1.15	3.56	5.88	3.25
May	1.10	2.12	1.69	1.60	1.60	1.60	1.60	1.60	1.60	1.70	1.70	1.29	1.51	1.39	1.25	1.60	1.12	1.15	3.75	6.60	3.25
June	1.10	2.32	1.39	1.60	1.69	1.60	1.60	1.60	1.60	1.70	1.62	1.25	1.48	1.35	1.25	1.45	1.10	1.16	3.63	8.00	3.25
July	1.09	2.45	1.16	1.60	1.75	1.60	1.60	1.60	1.60	1.70	1.60	1.33	1.41	1.35	1.30	1.45	1.10	1.22	3.44	9.00	3.25
Aug.	1.12	2.55	1.09	1.60	1.75	1.60	1.60	1.60	1.60	1.70	1.60	1.40	1.40	1.34	1.35	1.44	1.18	1.26	3.70	8.80	3.25
Sept.	1.15	2.85	1.11	1.60	1.75	1.60	1.44	1.60	1.60	1.70	1.60	1.46	1.40	1.29	1.47	1.40	1.20	1.34	4.00	8.00	3.25
Oct.	1.12	2.79	1.07	1.60	1.84	1.60	1.40	1.60	1.60	1.70	1.60	1.50	1.40	1.17	1.53	1.36	1.14	1.44	4.00	3.25	3.25
Nov.	1.11	2.52	1.31	1.60	1.82	1.60	1.40	1.60	1.62	1.70	1.60	1.54	1.40	1.13	1.59	1.26	1.08	1.65	4.15	3.25	3.25
Dec.	1.16	2.30	1.39	1.60	1.82	1.60	1.45	1.60	1.70	1.70	1.60	1.55	1.40	1.15	1.60	1.20	1.05	2.04	4.25	3.25	3.13

Beams at Pittsburgh, in Cents per Pound

Jan.	1.15	1.30	2.25	1.50	1.60	1.80	1.60	1.50	1.70	1.70	1.70	1.60	1.55	1.40	1.15	1.75	1.20	1.10	1.90	3.25	3.00
Feb.	1.15	1.30	2.25	1.50	1.60	1.60	1.60	1.50	1.70	1.70	1.70	1.52	1.51	1.40	1.11	1.71	1.20	1.10	2.06	3.25	3.00
March	1.15	1.40	2.25	1.52	1.70	1.60	1.60	1.60	1.70	1.70	1.70	1.30	1.50	1.40	1.15	1.70	1.19	1.10	2.40	3.54	3.00
April	1.15	1.50	2.25	1.60	1.70	1.60	1.60	1.60	1.70	1.70	1.70	1.27	1.50	1.40	1.21	1.68	1.15	1.20	2.55	3.88	3.00
May	1.15	1.50	2.25	1.60	1.60	1.60	1.60	1.60	1.70	1.70	1.70	1.27	1.50	1.39	1.25	1.50	1.14	1.20	2.60	4.00	3.00
June	1.15	1.70	2.07	1.60	1.60	1.60	1.60	1.60	1.70	1.70	1.62	1.25	1.48	1.35	1.25	1.45	1.11	1.20	2.53	4.31	3.00
Ju'y	1.15	1.94	1.90	1.60	1.84	1.60	1.60	1.60	1.70	1.70	1.60	1.33	1.41	1.35	1.30	1.45	1.12	1.25	2.50	4.50	3.00
Aug.	1.21	2.05	1.74	1.60	2.00	1.60	1.60	1.63	1.70	1.70	1.60	1.40	1.40	1.35	1.35	1.45	1.19	1.30	2.52	4.30	3.00
Sept.	1.20	2.25	1.50	1.60	2.00	1.60	1.44	1.70	1.70	1.70	1.60	1.46	1.40	1.34	1.42	1.41	1.20	1.35	2.64	4.00	3.00
Oct.	1.20	2.25	1.50	1.60	2.07	1.60	1.40	1.70	1.70	1.70	1.60	1.50	1.40	1.21	1.48	1.37	1.15	1.44	2.75	3.00	3.00
Nov.	1.20	2.25	1.50	1.60	2.05	1.60	1.40	1.70	1.70	1.70	1.60	1.54	1.40	1.13	1.57	1.29	1.10	1.60	2.86	3.00	3.00
Dec.	1.20	2.25	1.50	1.60	2.00	1.60	1.44	1.70	1.70	1.70	1.60	1.55	1.40	1.15	1.60	1.25	1.07	1.78	3.25	3.00	2.90

Wire Nails at Pittsburgh, per Keg of 100 lb.

Jan.	$1.42	$1.43	$3.20	$2.22	$1.99	$1.89	$1.89	$1.75	$1.85	$2.00	$2.05	$1.95	$1.85	$1.71	$1.57	$1.75	$1.54	$1.54	$2.13	$3.00	$3.50
Feb.	1.45	1.57	3.20	2.30	2.05	1.92	1.90	1.80	1.85	2.00	2.05	1.95	1.85	1.75	1.60	1.75	1.60	1.57	2.25	3.00	3.50
March	1.43	1.94	3.20	2.30	2.05	2.00	1.91	1.80	1.85	2.00	2.05	1.95	1.85	1.79	1.60	1.76	1.60	1.60	2.40	3.20	3.50
April	1.31	2.05	2.95	2.30	2.05	2.00	1.90	1.80	1.85	2.00	2.05	1.87	1.85	1.80	1.60	1.80	1.60	1.56	2.40	3.28	3.50
May	1.31	2.10	2.20	2.30	2.05	2.00	1.90	1.80	1.85	2.00	2.05	1.65	1.82	1.80	1.60	1.80	1.56	1.55	2.50	3.50	3.50
June	1.35	2.30	2.20	2.30	2.05	2.00	1.90	1.74	1.85	2.00	1.97	1.70	1.80	1.75	1.60	1.80	1.50	1.55	2.50	3.75	3.50
July	1.31	2.42	2.20	2.30	2.05	2.00	1.89	1.70	1.84	2.00	1.95	1.72	1.75	1.70	1.62	1.70	1.52	1.60	2.50	4.00	3.50
Aug.	1.26	2.50	2.20	2.30	2.05	2.00	1.71	1.70	1.82	2.00	1.95	1.80	1.70	1.69	1.66	1.65	1.56	1.61	2.58	4.00	3.50
Sept.	1.32	2.76	2.20	2.30	2.03	2.00	1.60	1.74	1.86	2.05	1.95	1.80	1.70	1.65	1.70	1.65	1.60	1.69	2.60	4.00	3.50
Oct.	1.33	2.87	2.20	2.28	1.89	2.00	1.60	1.80	1.85	2.05	1.95	1.80	1.70	1.64	1.70	1.63	1.60	1.80	2.63	.....	3.50
Nov.	1.28	2.95	2.20	2.17	1.85	1.97	1.62	1.80	1.88	2.05	1.95	1.80	1.70	1.55	1.70	1.59	1.50	1.87	2.85	3.50	3.50
Dec.	1.27	2.95	2.20	1.99	1.85	1.87	1.73	1.80	2.00	2.05	1.95	1.85	1.70	1.53	1.72	1.55	1.51	2.04	3.00	3.50	3.50

Brief History of Twenty-one Years of Price Fluctuations

In plotting the lines on the accompanying chart, those representing finished material have been derived by multiplying the market prices of finished material per pound by 2240. In the tables, however, while pig-iron and steel-billet prices are in dollars per gross ton, those for finished material are in cents per pound.

The chart starts with 1898, as that was the year in which the depression following the panic of 1893 showed its most disastrous effects upon iron and steel prices. After the starved consumption of the panic period, demand in 1899 found capacity entirely inadequate. Almost as striking in the other way were the declines of 1900. In 1901 prices were fairly steady, with advances in the latter part of the year bringing another series of high points in 1902, though these were moderate in comparison with 1899. The sharp decline of 1903 is distinctly shown; the slight further decline extending over nine months in 1904, with advances in the latter part of the year and some reaction in 1905. A strong movement upward came in 1906, until substantially the levels of 1902 were reached, followed by recessions after the middle of 1907 in pig iron and billets, but finished material prices were held in the weeks following the October panic. The co-operative movement among steel manufacturers modified the decline in the depression of 1908, and in the spring of 1909 came abrupt declines. These stimulated buying, which gave the strong upward trend of the second half.

In 1910 pig iron reached again its low points of 1909, while finished materials only retraced part of the distance to the bottom touched after the open market declaration of February, 1909. Steadily declining prices marked 1911. The break in finished material in May followed notice by the Republic Iron & Steel Co. that it proposed to reduce its prices. There was a slight recovery in December. Early in 1912, however, active competition developed a further decline, and the low point for the year was touched in February in some products and in March in others. The high prices paid for early deliveries were a prime feature of the first four months of 1913. Business fell off as the summer advanced. This was more marked later, and in the last four months of the year prices declined sharply.

In 1914, finished materials gradually drooped as consumption fell off. There was an effort to advance prices in August, under the belief that the war would cause an increased call for American steel; but business continued to fall off, the low prices of the year being reached in December, when many plants operated only about one-third capacity. January, 1915, brought some activity to make up for the extreme depression just preceding. As spring came on, war demand for steel increased, and export prices advanced. An unparalleled scarcity of steel developed in the late summer and billets advanced rapidly. Plates late in the year went soaring, and wire products reached the highest point for 15 years in December. Pig iron lagged until August, and then rose, the advance by the end of the year being $5 or $6 a ton.

In 1916 advances in all forms of finished material, due to the enormous demand for shell steel from the Allies and to export demand from all countries, made what were considered high prices in 1915 look cheap. Mills were utterly unable to cope with the business offered, both export and domestic. Pig iron, which for months lagged far behind steel, began advancing in September after heavy sales to Europe, and in November the excited scramble for iron for delivery in 1917 sent prices up by leaps and bounds. The upward movement continued in 1917, not interrupted, but in some products only intensified, by the entrance of the United States into the world war. The climax was reached in July, and the turn came after President Wilson's appeal to producers in all lines to make one price to the Government, its Allies and the public. Government prices, which were generally from 30 to 50 per cent below the high level prices, prevailed in the last three months of the year. In 1918 Government control continued, with no change in prices of finished material and only a slight reduction in pig iron. In the middle of December, five weeks after the armistice, rolled products were reduced $4 to $6 a ton on the ending of Government control and an open market came again.

Prices used in plotting the charts are for delivery in from one to three months, and thus do not represent the extreme prices paid at times for prompt delivery.

Connellsville Coke Prices for Eighteen Years

We present below tables showing monthly prices of prompt shipment Connellsville furnace and foundry coke for 18 years, 1901 to 1918, inclusive, averaged from weekly quotations in THE IRON AGE.

Average Prices of Prompt Connellsville Furnace Coke, per Net Ton at Oven

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
Jan.	$1.75	$2.90	$5.00	$1.60	$2.46	$2.62	$3.53	$1.92	$1.59	$2.55	$1.40	$1.82	$3.88	$1.85	$1.50	$2.94	$9.50	$6.00
Feb.	1.75	2.50	5.00	1.52	2.56	2.14	3.50	1.86	1.59	2.12	1.45	1.78	2.52	1.85	1.50	3.38	9.62	6.00
March	1.90	2.87	5.00	1.65	2.43	2.24	3.02	1.72	1.60	2.00	1.55	2.12	2.40	1.90	1.50	3.47	9.60	6.00
April	2.00	2.50	4.20	1.60	2.07	2.45	2.72	1.57	1.60	1.77	1.59	2.39	2.15	1.86	1.50	2.41	7.38	6.00
May	2.00	2.50	3.50	1.50	1.87	2.46	2.16	1.50	1.57	1.66	1.50	2.28	2.13	1.77	1.50	2.30	7.80	6.00
June	1.87	2.69	3.00	1.45	1.82	2.32	1.89	1.55	1.52	1.65	1.42	2.02	2.11	1.75	1.56	2.49	11.25	6.00
July	1.75	3.00	2.50	1.45	1.81	2.51	2.40	1.57	1.58	1.59	1.44	2.21	2.45	1.75	1.64	2.75	12.75	6.00
Aug.	1.75	3.87	2.25	1.45	1.80	2.76	2.62	1.50	1.66	1.57	1.46	2.21	2.50	1.70	1.50	2.80	13.60	6.00
Sept.	1.75	5.00	2.20	1.45	2.10	2.85	2.82	1.50	2.39	1.60	1.50	2.37	2.29	1.65	1.61	2.94	11.12	6.00
Oct.	1.77	8.00	1.90	1.47	2.61	2.84	2.85	1.53	2.76	1.59	1.50	3.41	2.18	1.60	2.03	4.88	6.00	6.00
Nov.	1.95	6.00	1.75	2.04	2.95	3.13	2.41	1.72	2.74	1.50	1.52	3.94	1.82	1.52	2.28	6.90	6.00	6.00
Dec.	2.14	6.00	1.62	2.12	2.79	3.52	2.06	1.82	2.67	1.44	1.60	4.00	1.75	1.50	2.64	8.38	6.00	6.00

Average Prices of Prompt Connellsville Foundry Coke, per Net Ton at Oven

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
Jan.	$2.25	$3.17	$6.50	$2.18	$2.38	$3.42	$4.25	$2.45	$2.00	$2.90	$1.90	$1.97	$4.40	$2.50	$2.00	$3.50	$9.75	$7.00
Feb.	2.31	3.50	6.50	2.10	2.68	2.65	4.00	2.39	1.95	2.70	2.10	2.09	3.25	2.50	2.00	3.50	11.00	7.00
March	2.50	3.50	6.50	2.25	2.75	2.78	3.65	2.25	1.95	2.60	2.05	2.56	3.00	2.45	2.00	3.75	11.60	7.00
April	2.50	3.12	5.50	2.15	2.70	2.95	3.31	2.22	1.86	2.45	2.00	2.69	3.00	2.40	2.00	3.56	9.13	7.00
May	2.50	3.15	4.50	2.00	2.55	2.81	3.00	2.03	1.85	2.20	1.81	2.58	2.85	2.40	2.00	3.25	8.90	7.00
June	2.37	2.87	3.50	1.90	2.40	2.65	3.00	2.00	1.80	2.17	1.76	2.40	2.80	2.32	2.00	3.25	11.72	7.00
July	2.25	3.20	3.25	1.80	2.35	2.79	3.00	2.00	2.00	2.15	1.82	2.40	2.70	2.22	2.05	3.25	13.25	7.00
Aug.	2.25	4.25	3.00	1.75	2.25	3.00	3.08	1.92	1.95	2.15	1.85	2.40	2.90	2.25	2.00	3.30	13.20	7.00
Sept.	2.25	6.00	2.87	1.85	2.50	3.19	3.20	1.90	2.55	2.12	1.85	2.54	2.90	2.10	2.07	3.31	11.75	7.00
Oct.	2.25	9.00	2.87	2.00	3.00	3.31	3.25	2.10	2.90	2.10	1.81	3.65	2.81	2.00	2.35	3.88	6.00	7.00
Nov.	2.31	7.00	2.50	2.25	3.50	4.00	2.75	2.20	3.25	2.05	1.85	4.25	2.60	1.92	2.88	7.10	7.00	7.00
Dec.	2.39	7.00	2.25	2.35	3.50	4.12	2.50	2.25	3.20	1.97	1.90	4.50	2.50	1.90	2.95	8.63	7.00	7.00

Attention should be called to the peculiar conditions prevailing in the coke market in the last half of 1902 and the first half of 1903. In all this period coke prices were seriously affected by the extraordinary demand for coke caused by the scarcity of anthracite coal resulting from the great strike of anthracite coal miners which began in the spring of 1902 and was not settled until late in that year. For several months blast furnaces and foundries were greatly hampered in their operations by inability to secure a regular supply of fuel. Prompt furnace and foundry coke at this time sold as high as $11 per ton at oven, and it is possible that even higher prices may have been realized. Blast furnaces were often banked for a week or two awaiting coke deliveries, and many foundries ran intermittently. Coke was imported to some extent for the use of blast furnaces and foundries located near the seaboard, and foundry coke was shipped all the way to Chicago from Colorado. The quotations which are above given for this period are therefore to be regarded as to some extent conjectural.

Heavy Melting Steel Scrap Prices, Pittsburgh

The appended table gives the average monthly prices of heavy melting steel scrap at Pittsburgh for 18 years, comprising 1901 to 1918, inclusive. These prices are in dollars per gross ton and are averaged from weekly quotations in the Pittsburgh iron market report of THE IRON AGE.

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
Jan.	$13.00	$17.40	$21.20	$12.50	$16.25	$17.25	$18.95	$12.80	$16.63	$17.69	$13.50	$12.75	$14.95	$13.62	$11.63	$17.50	$22.60	$30.00
Feb.	14.50	17.63	21.13	13.50	15.88	16.31	18.06	13.88	15.63	17.25	14.13	12.12	14.19	12.62	11.63	17.06	21.75	30.00
March	16.00	18.50	21.00	14.00	15.90	14.70	18.00	13.19	14.19	16.80	14.35	12.62	14.19	12.12	12.00	18.45	23.25	30.00
April	16.50	19.00	21.50	13.63	16.00	14.75	17.94	12.80	14.00	16.50	13.06	13.06	14.19	12.00	11.81	17.81	28.00	28.50
May	17.00	20.00	21.25	12.13	15.00	14.80	18.10	12.81	14.81	15.30	12.62	13.25	13.55	12.00	11.75	16.95	28.80	28.50
June	17.50	21.25	20.00	11.30	13.90	15.63	18.38	13.13	15.69	15.10	12.95	13.44	12.62	12.00	11.75	15.88	41.00	28.62
July	17.00	21.90	19.70	10.75	14.00	15.75	18.06	14.25	15.9.	14.50	13.06	13.34	12.40	12.00	12.31	16.31	39.00	29.00
Aug.	16.00	21.00	18.50	11.38	14.85	16.50	17.75	14.81	16.31	14.31	13.20	13.55	12.37	11.50	13.81	16.05	32.83	29.00
Sept.	15.00	21.50	17.25	11.50	15.88	16.88	17.38	14.25	17.40	14.35	12.50	14.11	12.25	11.31	14.30	16.19	33.25	29.00
Oct.	17.50	21.50	15.30	12.25	16.50	17.13	17.10	15.20	17.94	14.25	12.06	15.85	11.85	10.85	14.38	18.25	28.80	29.00
Nov.	18.00	21.00	13.25	14.25	17.50	18.00	14.88	16.06	17.50	14.25	12.00	15.12	11.44	10.00	15.88	21.20	29.50	28.87
Dec.	17.50	21.00	11.20	16.20	17.63	20.00	13.00	16.70	18.00	13.75	12.31	14.75	11.08	10.75	17.45	26.00	30.00	26.87

Wire Rod Prices at Pittsburgh for Eighteen Years

Quotations on wire rods did not regularly appear in market reports until 1901. The table given below therefore represents the available figures as far back as public prices are concerned. They are for Bessemer wire rods, per gross ton, at Pittsburgh, averaged from weekly quotations in THE IRON AGE. The quotations for November and December, 1917, and all of 1918, are Government prices and apply also to open-hearth rods.

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
Jan.		$33.45	$34.70	$30.00	$31.00	$33.75	$37.00	$34.30	$33.00	$33.00	$28.00	$24.37	$30.00	$25.50	$25.00	$43.00	$75.00	$57.00
Feb.		35.00	35.75	30.00	31.00	34.00	37.00	35.00	33.00	33.00	28.75	25.00	30.00	26.38	25.00	48.00	77.50	57.00
March		35.50	36.62	30.80	31.70	34.00	37.00	35.00	33.00	33.00	29.00	25.00	30.00	26.50	25.00	54.80	81.00	57.00
April		36.00	37.00	31.00	34.00	34.12	37.00	35.00	29.00	32.50	29.00	25.00	30.00	26.00	25.00	60.00	85.00	57.00
May		36.80	37.00	30.50	34.00	34.40	37.00	35.00	27.50	32.00	29.00	25.00	30.00	25.50	25.00	60.00	86.00	57.00
June		37.00	36.62	29.20	33.30	34.00	37.12	33.50	27.50	30.80	28.25	25.00	29.50	24.50	25.00	53.75	92.50	57.00
July		36.00	35.80	28.00	31.87	34.00	36.50	33.00	29.40	29.25	27.00	25.00	28.30	24.50	25.63	53.75	96.25	57.00
Aug.		36.00	35.00	28.00	32.10	34.00	36.10	33.25	31.00	28.25	27.0	25.80	28.00	25.00	27.00	55.00	94.00	57.00
Sept.		35.87	34.75	27.00	31.12	34.00	36.00	33.00	31.50	28.00	27.00	27.00	27.37	26.20	29.40	55.00	88.75	57.00
Oct.	$32.75	35.90	34.00	26.00	31.75	34.50	35.40	33.00	31.87	28.50	26.00	28.50	26.60	25.88	31.75	55.00	77.25	57.00
Nov.	33.00	35.50	31.62	26.75	32.10	35.50	34.00	33.00	32.50	28.12	25.30	29.75	25.87	25.25	36.25	63.00	57.00	57.00
Dec.	32.62	34.50	30.50	29.80	32.50	37.00	34.00	33.00	33.00	28.00	24.50	30.00	25.17	25.00	39.50	68.75	57.00	57.00

Cast-Iron Pipe Prices—1900-1918

The accompanying diagrams show the course of prices for the past 16 years on 6-in. cast-iron water pipe, f.o.b. New York, in carload lots, per ton of 2000 lb. The table given below is presented for those desiring the data on which the pipe curve is constructed, but going back to 1900. The prices for the first ten years were furnished by Daniel Runkle, at that time with the Warren Foundry & Machine Co., 11 Broadway, New York, and for the remainder of the period covered were averaged from weekly quotations in THE IRON AGE:

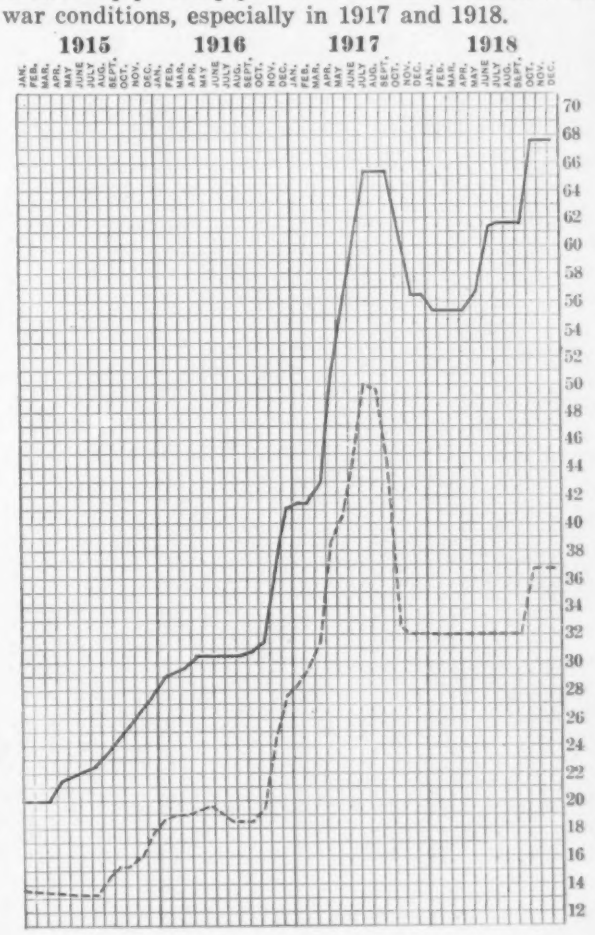
Cast-Iron Pipe Prices at New York, 6-Inch, per Net Ton

	1900	1901	1902	1903	1904	1905	1906	1907	1908
January	$27.50	$21.75	$24.50	$29.25	$24.50	$28.00	$29.75	$34.25	$27.00
February	26.75	22.25	25.00	29.25	24.25	28.50	29.50	34.25	26.75
March	26.75	21.50	26.25	30.75	24.25	26.75	30.50	34.00	26.25
April	26.50	22.00	26.00	31.00	24.25	27.00	29.75	33.50	26.25
May	26.00	22.25	27.75	30.75	24.00	27.25	31.00	34.25	26.25
June	24.50	23.00	28.00	30.75	23.50	27.25	32.50	33.50	25.75
July	24.75	23.75	28.50	30.75	23.50	27.25	30.25	34.00	25.75
August	23.50	23.75	29.50	29.50	23.50	27.75	30.50	32.50	25.25
September	22.25	23.50	29.50	29.00	23.00	27.25	31.00	33.00	25.75
October	21.75	24.00	29.50	26.00	23.25	28.25	33.00	33.50	25.75
November	21.75	24.50	30.75	24.50	25.00	29.00	33.25	28.50	25.00
December	21.75	23.75	29.25	24.25	27.00	29.25	35.50	28.00	25.50

	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
Jan.	$24.50	$25.50	$22.00	$22.00	$25.00	$22.00	$20.00	$29.00	$41.50	$55.35
Feb.	24.25	25.50	21.50	22.00	24.75	22.00	20.00	29.33	41.50	55.35
March	25.25	25.50	21.00	22.00	23.87	22.00	20.00	29.75	43.10	55.35
April	25.00	25.50	21.00	21.25	23.50	22.00	21.60	30.50	50.88	55.35
May	25.25	25.50	21.00	21.00	23.00	20.88	22.00	30.50	55.50	56.60
June	26.00	25.25	21.00	21.00	23.00	20.50	22.25	30.50	60.75	61.44
July	26.25	24.00	21.00	22.10	23.00	20.50	22.50	30.50	65.50	61.75
Aug.	26.00	23.50	21.00	22.00	23.00	20.50	23.25	30.50	65.50	61.75
Sept.	25.75	23.50	21.00	23.12	23.00	20.40	24.37	30.83	65.50	61.75
Oct.	25.50	23.00	21.00	24.50	23.00	20.00	25.25	31.50	61.00	67.70
Nov.	25.87	22.12	21.40	24.12	23.00	20.00	26.50	35.50	56.50	67.70
Dec.	25.70	22.00	22.00	24.62	22.33	20.00	27.60	41.00	56.50	67.70

To show how closely cast-iron pipe prices follow the fluctuations in pig iron, we have added to the pipe curves another giving the course of prices on gray forge pig iron at Philadelphia and vicinity, as gray forge is largely used in making pipe. These prices, on which this curve is constructed, also going back to 1900, have been averaged from weekly prices in THE IRON AGE, and are in the table below.

Prices for the past four years have been plotted on a large scale to show in full detail the great increase on pipe and pipe iron costs that resulted from war conditions, especially in 1917 and 1918.



Cast-Iron Pipe— Gray Forge Pig Iron---

Detail Diagram of Course of Cast-Iron Pipe and Gray-Forge Iron Prices in Past Four Years Under Stimulus of War

Gray Forge Pig Iron, Philadelphia and Vicinity, Gross Ton

	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
January	$20.37	$14.50	$15.75	$21.75	$13.50	$16.25	$16.75	$23.50	$16.50	$16.25	$17.75	$14.25	$14.25	$17.65	$14.00	$13.50	$18.44	$28.38	$32.00
February	20.25	14.50	15.75	21.25	13.50	15.75	17.00	23.50	16.50	16.25	17.50	14.25	14.25	17.31	14.00	13.44	19.00	29.75	32.00
March	19.25	14.00	17.50	20.00	12.75	16.25	16.75	23.50	16.50	15.50	16.90	14.60	14.25	16.87	14.00	13.25	19.00	31.94	32.00
April	18.75	14.37	18.25	20.00	13.75	16.25	16.75	23.00	16.00	15.00	16.62	14.75	14.37	16.56	14.00	13.25	19.13	38.50	32.00
May	18.00	14.37	19.00	19.50	13.75	16.00	16.50	23.25	16.00	15.00	16.00	14.70	14.50	15.81	13.81	13.25	19.50	40.40	32.00
June	16.50	14.37	19.25	18.25	13.50	15.75	16.25	23.00	15.25	15.25	15.65	14.50	14.62	15.37	13.75	13.25	19.25	44.31	32.00
July	14.50	14.12	21.75	18.12	13.25	14.50	16.10	22.50	15.25	15.50	15.37	14.50	14.87	14.95	13.75	13.25	18.50	50.05	32.00
August	14.50	14.00	21.00	15.50	12.50	15.00	16.50	20.50	15.25	16.25	15.00	14.30	15.37	14.62	13.75	14.50	18.50	49.56	32.00
September	14.00	14.00	21.00	14.75	13.00	15.00	17.75	19.50	15.50	17.00	14.75	14.45	15.87	14.56	13.75	15.13	18.50	44.25	32.00
October	13.50	14.12	21.00	14.50	12.75	15.75	18.25	18.75	15.50	17.50	14.50	14.25	16.87	15.00	13.62	15.25	19.35	32.20	36.60
November	14.00	14.37	22.00	14.00	14.00	16.25	20.00	17.00	15.75	18.00	14.37	14.25	17.62	14.75	13.50	16.05	23.75	32.00	36.60
December	14.50	14.87	22.25	14.00	15.50	16.50	22.00	16.75	16.00	18.00	14.25	14.25	17.75	14.58	13.50	17.63	27.69	32.00	36.90

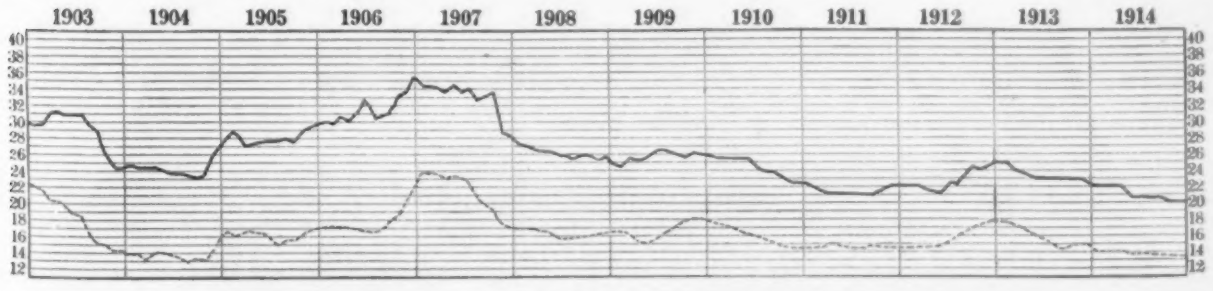


Diagram Showing the Fluctuation of Prices of Cast-Iron Water Pipe at New York for the Period 1903 to 1914, inclusive. Compared with course of prices on gray forge pig iron at Philadelphia. The pipe is 6-in., carload lots, prices per ton of 2000 lb. The heavy black line indicates the pipe prices and the dotted line the pig-iron prices

Philadelphia Scrap Prices, 1897 to 1918

These Prices, Delivered Eastern Pennsylvania, Are Averaged from Weekly Quotations in THE IRON AGE

Heavy Melting Steel Scrap—Per Gross Ton

	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
January	11.75	10.19	11.16	20.00	14.90	18.30	20.00	11.56	17.44	17.33	18.61	11.70	16.94	17.00	12.50	12.19	14.40	10.40	10.00	16.38	21.70	30.00
February	11.00	10.25	11.59	21.25	15.62	19.00	20.19	12.56	17.37	16.62	18.69	14.25	15.58	16.62	13.50	11.70	12.87	11.00	10.00	16.50	20.63	30.00
March	10.04	10.25	13.65	21.90	16.00	20.12	20.75	14.00	17.62	15.80	18.87	13.12	13.50	16.50	14.05	11.80	13.25	11.31	10.80	16.90	23.50	29.00
April	10.20	10.19	14.12	21.90	16.75	20.87	20.75	14.69	17.56	16.69	18.75	12.75	13.25	16.12	13.31	12.94	13.44	10.95	11.00	17.88	24.88	28.00
May	10.00	10.25	13.56	19.70	16.55	21.00	20.56	12.50	15.94	16.30	18.95	12.81	14.75	14.75	13.00	13.50	12.10	10.63	11.25	16.60	25.40	29.00
June	9.81	10.35	14.20	16.66	15.75	20.94	20.50	11.35	14.55	15.75	18.75	13.25	15.81	14.45	13.00	13.50	11.75	10.50	11.10	15.31	34.13	29.00
July	10.05	9.75	15.33	11.50	15.81	21.00	19.00	11.12	15.16	15.87	17.62	13.80	15.80	14.12	13.19	13.50	11.35	10.30	12.06	14.94	35.20	29.00
August	10.37	9.81	16.40	10.80	16.70	20.50	17.37	11.75	15.55	16.75	16.85	14.50	16.87	13.75	13.15	13.65	11.43	10.19	13.75	14.75	31.88	29.00
September	10.75	10.45	18.25	12.56	16.44	20.50	15.87	11.90	15.69	17.94	16.50	15.19	17.40	13.85	12.50	14.50	11.62	10.69	15.00	14.75	30.25	29.00
October	10.87	10.44	19.50	12.62	17.50	20.55	13.85	12.87	16.56	18.12	15.35	15.00	18.00	13.81	11.94	15.10	11.15	9.95	14.75	15.63	25.00	29.00
November	10.94	10.35	22.00	14.40	17.19	20.50	11.87	14.75	17.55	18.70	12.94	15.75	18.00	13.50	11.55	15.50	10.10	9.25	14.65	20.13	26.00	28.00
December	10.25	10.35	20.75	16.75	17.81	20.25	11.25	16.20	17.50	19.50	11.50	17.10	17.50	12.65	12.08	15.25	10.60	9.40	15.81	23.75	28.20	25.00

Heavy Cast Scrap—Per Gross Ton

January	9.77	9.25	9.58	17.37	14.50	14.40	19.75	12.75	16.00	16.00	21.70	15.30	15.87	17.00	14.00	13.42	14.50	12.00	12.00	17.00	20.20	30.00
February	9.60	9.25	10.91	17.37	14.00	14.81	19.81	12.81	15.62	15.87	22.00	15.00	15.00	16.12	14.38	13.00	14.37	12.88	12.00	17.00	20.00	30.00
March	9.57	9.25	11.80	17.15	14.00	16.00	20.00	13.30	15.75	15.50	22.25	15.00	14.00	16.00	14.40	13.12	14.00	13.00	12.00	17.00	21.75	30.00
April	9.30	9.25	13.00	16.62	14.00	17.06	20.00	13.37	16.00	15.50	21.25	15.00	14.10	15.87	13.44	13.62	13.94	13.00	11.75	17.88	26.63	29.00
May	9.00	9.25	12.75	15.60	13.95	17.70	19.25	12.50	15.19	15.40	20.80	14.87	14.69	15.06	13.13	13.75	13.60	12.25	12.13	17.50	29.00	29.00
June	9.00	9.20	13.25	14.00	13.52	18.25	18.37	11.60	14.20	15.37	20.75	14.25	15.00	15.00	13.00	13.75	13.25	12.00	12.25	16.50	33.50	29.00
July	9.30	9.00	13.68	13.00	13.62	17.75	17.50	11.25	14.00	15.12	19.25	14.00	14.85	14.94	13.06	13.75	13.00	12.00	12.38	16.00	36.30	29.00
August	9.50	9.00	14.25	13.30	13.75	18.25	15.87	11.50	14.40	16.30	18.60	14.25	15.37	14.25	13.20	13.75	12.87	12.00	13.30	16.00	33.25	29.00
September	9.50	9.20	15.06	14.37	13.75	19.00	14.75	11.50	15.12	17.44	18.00	15.25	15.90	14.00	12.69	14.96	12.81	12.00	14.00	16.00	31.00	29.00
October	9.69	9.25	16.87	13.50	13.75	19.50	13.90	12.37	15.75	18.37	17.60	15.25	16.94	14.00	12.44	14.50	13.50	11.40	14.00	16.15	28.00	29.00
November	9.75	9.25	17.90	13.69	14.00	19.50	12.87	13.75	16.00	19.20	16.50	15.44	17.50	14.00	12.25	14.75	12.62	11.00	14.50	18.50	30.00	29.00
December	9.35	9.25	17.50	14.12	14.00	19.50	12.50	14.90	16.00	21.12	15.50	16.00	17.50	14.00	13.00	15.00	12.17	11.30	16.06	20.75	30.60	29.00

Machine Shop Turnings—Per Gross Ton

January	8.12	7.87	8.58	15.12	9.85	12.95	16.00	8.94	14.50	14.50	16.05	9.00	13.63	14.38	8.12	9.00	11.20	7.30	8.00	11.13	12.90	19.00
February	8.00	7.87	8.83	15.25	10.00	13.50	16.00	9.12	15.75	13.81	16.25	9.87	12.00	13.50	9.49	9.25	10.37	9.00	8.00	9.88	12.38	18.63
March	8.00	8.00	10.25	15.10	10.89	14.44	16.50	9.45	15.19	13.55	16.75	9.62	10.08	12.80	10.00	8.80	10.12	8.75	8.13	10.25	14.13	18.25
April	7.80	8.00	11.00	14.94	12.00	16.37	16.50	10.12	14.75	13.81	16.55	8.40	10.10	11.44	8.81	9.69	10.31	7.90	8.25	11.00	15.25	18.50
May	7.50	8.00	11.37	13.90	12.00	16.20	15.75	9.50	13.50	13.19	16.95	9.12	11.62	9.94	8.25	10.40	9.20	7.50	8.44	11.75	16.00	18.50
June	7.50	8.00	11.75	10.00	11.56	16.00	15.12	8.20	11.00	12.31	16.94	9.50	12.50	9.65	8.40	10.31	8.00	7.69	8.50	8.63	20.25	18.50
July	7.45	8.00	12.50	8.75	11.50	16.50	14.40	7.94	10.66	11.69	15.37	9.80	12.45	9.62	9.00	10.50	7.85	7.75	8.63	8.50	23.70	18.50
August	7.25	7.87	12.50	8.20	11.50	16.12	13.00	8.56	12.90	12.65	14.30	10.75	13.50	8.81	9.30	10.65	8.00	7.94	9.80	8.05	20.75	18.50
September	7.70	8.00	12.75	8.50	11.56	16.00	11.00	8.75	13.62	13.75	14.00	11.50	14.35	8.75	8.19	10.94	8.00	8.56	10.56	7.44	20.38	18.75
October	8.19	8.00	14.00	8.50	11.75	16.00	10.50	9.00	14.25	14.25	12.85	11.80	15.50	8.62	8.00	11.40	7.85	7.90	10.13	10.13	18.00	19.00
November	8.19	8.00	15.55	8.85	12.25	16.00	9.75	9.62	14.40	13.85	10.50	12.94	15.06	8.50	8.00	11.50	7.00	11.50	10.25	10.38	18.00	19.00
December	8.00	8.10	15.50	9.75	12.75	16.00	9.19	12.50	14.50	15.94	9.00	13.90	14.15	8.15	8.91	11.00	7.08	7.65	11.00	3.38	18.20	18.00

Cast Borings—Per Gross Ton

January	7.12	6.87	7.58	13.62	7.94	8.00	10.00	6.50	11.19	11.00	13.55	7.00	12.62	12.22	8.12	8.31	10.85	7.80	8.00	11.50	13.94	17.00
February	6.81	6.75	7.83	13.50	8.00	8.00	10.69	7.00	11.25	10.31	14.50	8.37	11.00	11.50	8.81	8.00	10.37	9.19	8.00	11.00	13.38	17.38
March	6.75	6.94	9.25	13.60	8.00	8.62	11.12	7.35	11.31	9.85	15.37	7.75	8.17	11.20	9.60	8.50	10.06	8.94	8.00	11.00	15.00	17.50
April	6.60	7.00	10.00	13.25	8.37	10.00	11.55	7.56	11.25	10.25	15.69	7.50	8.65	10.38	8.25	9.37	10.25	8.30	8.00	11.38	15.63	17.50
May	6.50	7.00	10.37	11.50	8.75	10.05	11.06	6.75	9.87	9.50	16.00	8.12	9.87	9.84	7.75	9.60	9.17	8.00	8.00	12.75	16.10	17.50
June	6.50	7.00	10.75	8.25	8.00	10.37	10.31	6.35	8.00	9.37	16.12	8.75	10.50	8.80	7.90	9.50	8.25	8.00	8.10	10.00	21.50	17.63
July	6.35	7.00	11.00	7.62	7.81	10.50	9.40	6.12	7.83	9.31	14.37	9.00	10.40	9.50	8.63	9.56	7.85	8.00	8.50	10.00	25.00	18.00
August	6.25	6.87	11.00	6.55	7.25	10.12	8.31	6.50	9.20	10.25	13.50	10.00	11.44	9.31	8.80	9.75	7.94	8.50	9.80	9.50	22.25	18.38
September	6.60	7.00	11.31	6.69	7.31	10.00	7.50	6.75	9.87	11.25	12.81	11.00	12.45	9.25	7.69	10.06	8.18	8.56	10.44	9.13	22.00	18.75
October	7.19	7.00	12.94	6.75	7.50	10.00	7.15	7.11	9.87	11.37	11.20	11.25	13.37	9.06	7.50	10.85	7.90	8.00	10.25	10.10	19.20	19.00
November	7.19	7.00	14.25	7.25	7.87	10.19	6.81	7.75	10.60	12.50	8.37	12.00	13.19	8.50	7.50	11.37	7.50	7.50	10.05	11.63	20.00	19.00
December	7.00	7.10	14.25	7.75	8.00	10.00	6.44	9.80	10.50	13.00	7.00	12.75	12.10	8.15	8.09	10.83	7.17	7.65	11.00	14.50	20.00	17.00

No. 1 Railroad Wrought—Per Gross Ton

January	12.87	12.37	13.16	22.75	18.00	20.00	22.40	15.12	20.75	21.16	22.55	14.30	19.50	19.56	15.63	15.37	16.10	13.05	12.00	22.00	26.60	35.00
February	12.75	12.25	13.50	23.00	18.12	21.00	22.87	15.75	21.50	19.87	21.50	15.94	17.75	18.94	16.06	14.00	15.12	14.38	12.00	21.63	25.50	35.00
March	12.56	12.25	16.00	23.00	19.50	22.50	23.25	17.20	22.37	19.20	21.12	15.31	15.00	19.00	17.20	14.12	15.25	14.00	12.50	22.13	30.75	35.00
April	12.00	12.25	17.50	23.00	19.50	24.37	23.45	17.75	22.50	20.00	20.50	15.00	15.25	18.69	16.06	15.44	15.37	13.25	12.69	23.38	36.00	35.00
May	11.50	12.00	17.75	21.60	19.00	23.60	22.50	15.75	18.75	19.20	20.60	15.00	17.12	17.50	15.25	15.75	15.00	12.63	12.94	22.50	41.40	34.00
June	11.50	12.00	18.60	16.25	18.12	23.37	20.87	13.00	16.00	17.87	20.75	15.25	18.19	16.70	15.00	15.44	14.75	12.50	13.00	20.50	51.25	34.00
July	11.50	12.50	19.50	14.75	17.50	23.00	19.40	12.69	16.16	17.50	19.12	15.95	17.45	16.00	15.13	15.50	13.90	12.20	13.44	19.50	50.60	34.00
August	11.50	12.00	19.80	13.70	18.00	23.00	17.50	13.44	18.80	19.70	18.30	17.50	18.87	15.37	15.70	15.80	14.00	12.00	14.95	20.20	45.00	34.00
September	12.05	12.00	20.87	14.37	17.87	23.75	17.00	14.45	20.50	21.25	18.00	18.25	19.95	16.10	14.75	16.31	14.68	12.38	16.50	20.00	44.00	34.00
October	13.12	12.00	24.37	14.87	18.20	23.70	16.50	15.37	21.62	22.25	17.50	18.30	20.75	16.19	13.94	16.80	14.00	11.80	16.13	21.63	37.20	34.00
November	13.12	12.00	26.00	16.50	19.75	22.50	15.25	17.00	22.70	22.25	15.75	19.19	20.75	16.00	13.85	17.06	13.00	11.50	16.50	24.13	35.00	34.00
December	12.25	12.19	24.50	17.62	20.00	22.00	14.50	19.10	21.87	23.25	14.62	19.95	19.50	15.90	15.00	16.25	12.75	11.50	20.06	26.75	35.00	33.00

Old Iron Axles—Per Gross Ton

January	16.19	15.00	15.16	26.25	20.00	24.20	29.00	15.50	23.12	27.50	31.00	23.00	24.25	28.00	26.00	22.25	26.20	21.00	17.50	27.00	43.40	.....
February	15.69	15.00	15.50	26.00	20.00	24.50	29.25	18.25	23.25	26.50	31.00	23.00	22.00	27.62	26.00	22.00	27.00	23.00	17.50	27.00	43.00	.....
March	14.75	15.00	18.00	26.00	21.50	25.50	30.00	20.10	25.25	24.60	31.00	21.00	18.00	27.60	26.00	22.00	27.00	22.25	17.50	27.00	43.00	.....
April	14.00	15.00	20.75	25.50	22.00	26.25	30.00	21.75	26.00	25.62	30.37	20.00	18.10	28.00	25.00	23.37	26.75	21.00	17.50	28.00	46.00	.....
May	14.00	15.00	21.00	23.00	21.70	27.40	29.00	18.75	24.50	25.50	30.70	20.00	20.75	26.50	24.25	23.00	26.00	20.00	17.50	28.00	47.00	.....
June	12.50	15.00	22.50	17.75	21.50	29.00	26.75	16.80	21.80	25.00	31.12	20.00	22.25	26.50	24.00	23.25	25.50	20.00	17.50	28.00	47.00	.....
July	13.40	15.00	23.00	15.50	21.50	29.00	24.80	17.25	21.33	25.12	29.00	20.80	23.50	26.50	24.25	24.00	25.00	20.00	17.75	28.00	.....	.....
August	13.50	15.00	24.60	15.00	22.40	29.50	20.62	17.62	24.00	27.40	28.30	22.25	24.00	26.50	24.50	24.00	25.00	20.00	20.60	28.00	.....	.....
September	13.10	15.00	26.25	15.00	22.00	29.25	29.25	18.10	25.00	29.87	27.50	22.50	26.30	26.50	24.00	24.12	25.00	19.75	22.00	34.25	.....	.....
October	13.75	15.00	27.75	15.75	23.50	30.00	18.80	19.25	26.12	31.00	27.20	22.50	29.00	26.50	23.50	24.70	25.00	17.80	22.00	35.00	.....	.....
November	14.75	15.00	32.00	18.80	23.75	29.25	17.50	20.44	27.30	31.30	24.50	23.25	30.00	26.50	21.30	25.75	22.00	17.50	22.00	40.00	.....	.....
December	15.00	15.00	29.00	20.00	24.00	29.00	15.62	23.10	27.12	32.00	23.00	23.95	30.00	26.50	21.50	26.00	21.00	17.50	25.75	45.00	.....	.....

Old Steel Axles—Per Gross Ton

January	11.00	12.00	12.16	27.25	17.00	19.00	25.00	14.25	20.12	20.62	22.30	18.10	22.50	23.00	19.50	17.25	19.80	15.50	13.38	25.00	43.40	.....
February	11.87	12.00	12.68	27.00	17.00	.....	25.25	16.00	20.25	19.87	21.81	18.00	20.50	22.62	20.12	17.00	19.00	16.75	13.50	25.00	43.00	.....
March	12.75	12.00	15.15	27.00	17.00	22.00	26.00	17.00	21.25	19.30	22.00	17.62	17.00	22.40	20.80	17.00	19.00	16.25	14.00	25.00	43.00	.....
April	12.40	12.00	16.50	27.00	17.00	24.33	26.00	18.00	22.25	20.12	21.62	17.50	17.05	22.60	20.00	1.700	19.00	15.05	14.00	26.00	46.00	.....
May	12.37	12.00	16.50	24.20	17.00	25.40	26.00	15.50	19.62	19.60	21.80	17.62	18.75	20.62	19.31	17.00	17.70	14.00	14.00	26.00	47.00	.....
June	11.00	12.00	16.60	16.00	17.00	27.00	23.00	15.00	17.30	19.25	21.87	18.00	20.50	20.50	19.25	17.25	17.50	14.00	14.00	26.00	47.00	.....
July	11.60	12.00	17.00	16.00	17.00	27.50	21.80	14.75	17.00	18.75	20.25	18.30	21.30	20.12	19.37	17.50	17.50	14.00	14.25	26.00	.....	.....
August	11.75	12.00	17.80	17.70	17.00	26.25	19.50	14.62	20.10	20.75	20.20	19.62	21.87	20.00	19.50	17.50	17.50	14.50	17.60	30.00	.....	.....
September	11.60	12.00	18.75	15.00	17.50	26.00	18.00	15.20	21.00	22.25	20.00	21.25	22.90	20.00	19.00	18.00	18.12	14.81	19.50	34.25	.....	.....
October	12.00	12.00	27.00	15.40	19.00	25.90	16.40	16.25	21.12	23.87	20.00	21.25	23.62	20.00	18.00	18.70	18.10	13.60	19.50	35.00	.....	.....
November	12.00	12.00	30.00	17.00	19.00	25.25	14.50	17.87	21.50	23.30	19.62	21.62	24.00	20.00	17.20	19.75	16.44	13.00	20.70	40.00	.....	.....
December	12.00	12.00	28.00	17.00	19.25	25.00	14.12	18.70	21.50	24.50	18.50	22.20	24.00	19.50	17.25	20.00	15.56	13.00	25.00	45.00	.....	.....

Old Carwheels—Per Gross Ton

January	10.25	9.37	10.58	20.50	17.00	16.95	20.30	12.87	16.00	18.75	23.00	18.20	16.00	17.50	13.00	12.37	16.20	12.20	11.00	16.38	21.50	30.00
February	10.25	9.87	11.58	22.00	16.87	17.00	22.62	13.00	16.00	18.75	23.00	16.62	15.50	16.81	13.44	12.00	15.37	12.63	10.63	16.50	20.50	30.00
March	10.00	10.25	14.30	22.00	16.50	17.44	24.50	13.20	16.70	17.70	23.62	15.00	14.00	16.75	14.00	11.94	15.00	12.50	11.00	16.70	21.50	30.00
April	9.55	10.25	15.00	22.75	16.75	17.75	24.20	13.50	17.00	16.75	24.00	14.00	14.05	16.06	13.19	12.87	14.87	12.00	11.00	17.38	25.75	29.00
May	9.12	10.25	15.00	21.20	17.50	19.50	23.62	12.00	16.00	16.75	24.80	14.00	14.25	15.12	13.00	13.90	13.75	11.75	11.38	16.70	28.00	29.00
June	8.81	10.30	15.60	18.00	17.50	19.75	21.87	11.20	14.90	16.69	25.37	13.75	15.00	14.90	13.10	14.00	13.12	11.19	11.55	16.38	34.00	29.00
July	8.85	10.00	16.33	18.00	17.50	20.60	21.30	10.75	14.25	16.19	25.00	13.50	15.05	14.25	12.94	14.00	12.30	11.00	12.38	15.63	36.20	29.00
August	9.25	9.87	17.30	17.00	16.70	20.00	19.12	11.25	15.20	16.75	23.90	14.75	15.62	13.94	13.00	14.05	12.37	11.25	13.25	15.50	34.50	29.00
September	9.25	10.20	19.12	17.50	16.50	20.00	18.25	11.80	15.50	18.27	23.00	15.00	16.80	13.75	12.56	14.25	12.75	11.25	14.00	15.50	32.50	29.00
October	9.87	10.25	21.12	15.75	16.20	19.25	16.40	12.37	16.37	20.94	22.40	15.00	17.50	13.75	11.75	14.87	12.46	10.10	13.75	15.88	29.00	29.00
November	10.00	10.06	23.20	16.50	16.12	20.50	14.43	13.81	17.10	22.00	19.00	15.62	17.50	13.50	11.35	15.00	12.00	9.50	14.05	18.88	31.25	29.00
December	9.25	10.10	21.00	17.00	16.75	20.00	12.75	14.60	18.12	23.00	19.00	16.00	17.50	13.25	12.33	15.50	12.00	10.00	15.63	22.38	32.40	28.00

Scrap Prices at Chicago, 1903 to 1918

These Prices Are Averaged from Weekly Quotations in THE IRON AGE

Heavy Melting Steel Scrap, per Gross Ton

	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
January	$18.05	$10.13	$14.88	$14.95	$16.80	$11.05	$13.94	$16.00	$11.75	$10.75	$12.60	$9.35	$9.19	$15.50	$21.12	$30.00
February	18.13	10.88	14.13	13.63	15.75	12.50	13.56	15.50	12.06	10.75	12.13	10.50	9.56	14.75	21.50	30.25
March	18.31	11.50	14.45	13.00	16.00	11.44	12.13	15.00	12.15	10.94	12.08	9.81	9.63	16.50	23.70	29.87
April	18.35	11.25	14.38	13.50	15.75	11.05	12.35	14.44	11.75	11.56	12.50	9.80	9.15	16.50	27.00	28.75
May	17.63	9.75	12.55	13.70	15.60	10.62	13.44	13.56	10.50	12.05	11.25	9.69	9.37	15.94	28.70	28.80
June	16.50	9.30	11.95	13.13	16.25	11.62	14.50	13.15	10.38	12.12	10.44	9.75	9.44	14.80	36.50	29.00
July	16.30	9.00	12.75	13.13	16.12	11.75	14.06	12.38	10.69	11.69	10.50	9.75	10.40	14.50	33.00	29.00
August	16.00	9.25	13.15	14.10	15.10	12.88	15.00	12.25	11.05	12.25	10.56	9.69	11.56	15.25	29.60	29.00
September	13.75	10.00	14.38	16.50	14.75	13.00	16.00	12.25	10.70	12.81	10.06	9.19	11.75	16.06	31.25	29.00
October	12.80	10.88	14.50	16.60	14.70	13.45	16.43	12.25	10.00	13.95	10.00	8.50	11.75	16.81	26.00	29.00
November	11.25	12.55	15.20	17.50	12.63	14.88	16.00	12.25	9.75	13.69	9.56	8.06	13.44	20.60	27.60	28.50
December	9.00	14.15	15.25	17.13	11.50	15.17	16.00	12.10	10.25	12.88	9.00	8.43	15.63	23.00	28.37	22.75

Old Steel Rerolling Rails, per Gross Ton

January	$23.50	$11.75	$16.00	$16.50	$19.00	$12.30	$15.81	$18.00	$13.69	$13.00	$16.15	$11.10	$9.62	$17.06	$27.00	$35.00
February	23.50	13.13	15.13	16.25	19.00	13.00	15.12	18.00	13.63	12.80	15.50	11.81	9.87	17.06	27.00	35.00
March	22.13	13.00	15.30	15.70	19.00	12.19	13.06	17.80	13.65	12.75	15.00	11.56	10.25	17.65	28.00	34.75
April	22.00	13.00	15.44	15.75	18.50	12.60	13.20	17.69	13.44	12.88	14.63	11.50	10.25	18.00	32.62	33.50
May	22.13	11.88	14.06	16.00	18.60	12.94	14.44	17.12	13.49	13.50	13.95	11.31	10.25	17.38	36.50	34.00
June	21.00	10.80	12.95	15.88	18.94	13.94	15.50	16.50	12.38	13.50	12.69	11.50	10.25	15.85	46.90	34.00
July	19.00	10.31	13.56	15.50	18.00	14.50	15.40	15.88	12.25	13.50	12.25	11.50	10.30	15.25	45.19	34.00
August	19.00	11.50	14.35	15.90	17.00	15.63	16.12	15.31	12.65	14.00	12.12	11.50	12.25	15.80	39.20	34.00
September	17.33	11.81	15.25	17.63	16.75	16.18	17.15	15.25	12.75	15.00	12.25	10.75	13.35	17.06	39.75	34.00
October	15.40	12.38	15.63	18.63	17.15	15.80	18.00	15.25	12.44	16.30	12.15	10.00	13.31	18.81	34.75	34.00
November	13.50	14.75	16.30	21.15	15.06	17.19	18.00	15.06	12.30	16.50	12.00	9.50	14.44	24.50	34.80	33.50
December	10.60	16.00	16.50	21.00	12.94	16.95	18.00	14.20	12.50	16.50	11.33	9.50	16.63	28.63	35.25	27.50

Old Iron Rails, per Gross Ton

January	$24.00	$14.00	$21.13	$23.00	$27.40	$15.60	$18.81	$20.00	$15.00	$15.19	$17.05	$13.00	$11.38	$17.50	$27.00	$37.80
February	24.00	16.50	20.00	21.75	25.50	17.12	18.25	19.25	15.25	15.25	16.25	13.13	11.63	17.56	27.00	38.00
March	24.00	16.60	19.60	20.75	25.00	15.44	16.94	19.00	15.35	15.31	16.25	12.94	12.00	17.40	27.60	38.50
April	23.75	16.88	19.75	20.88	24.88	15.00	16.10	18.50	14.69	15.56	16.19	12.75	11.85	18.00	31.25	38.00
May	23.75	15.88	18.50	21.25	24.50	14.81	16.63	17.62	14.69	16.25	15.90	12.75	12.39	17.60	34.10	38.00
June	21.00	14.65	17.15	21.25	24.50	15.50	17.00	17.00	14.38	16.25	14.75	12.75	12.25	18.13	45.00	38.00
July	19.70	14.13	17.81	21.25	23.75	15.90	17.00	16.75	14.25	16.25	14.00	12.15	12.25	18.50	44.37	38.75
August	18.50	15.32	19.35	21.90	20.65	16.56	18.38	16.25	14.25	16.30	14.00	12.00	12.25	18.55	41.30	39.00
September	17.75	16.00	20.88	23.50	20.25	17.35	19.20	16.00	14.50	16.88	14.00	11.70	13.25	19.00	43.37	39.00
October	17.00	16.69	22.13	26.00	20.05	18.00	20.75	16.00	13.83	17.95	13.90	11.13	13.50	20.44	36.00	39.00
November	16.25	20.13	22.90	28.00	17.63	18.38	20.62	16.00	14.75	18.25	13.50	11.00	14.94	24.00	35.10	38.50
December	13.00	22.00	23.00	28.00	15.50	19.50	20.00	15.70	15.00	17.68	13.16	11.00	16.00	28.50	37.00	34.25

No. 1 Railroad Wrought, per Net Ton

January	$19.50	$10.85	$18.19	$17.30	$16.35	$11.20	$13.81	$14.88	$11.75	$11.63	$12.70	$8.70	$8.69	$15.88	$23.50	$31.25
February	19.50	12.50	17.00	15.88	15.50	12.44	12.88	14.69	12.00	11.30	12.19	9.50	8.87	14.94	23.75	31.25
March	19.75	12.80	16.40	14.88	15.25	11.25	11.43	14.45	12.30	11.44	12.13	9.06	9.00	16.20	25.90	30.75
April	20.40	12.50	16.06	14.50	15.25	11.00	11.90	14.19	11.69	12.31	12.38	9.00	8.65	17.00	30.35	30.20
May	19.13	11.38	14.19	14.50	15.45	10.75	12.81	12.87	11.38	12.75	11.25	9.00	8.94	16.50	32.60	29.75
June	16.13	10.50	13.50	13.50	16.06	11.69	13.38	12.75	11.25	12.57	10.56	9.00	9.00	15.20	41.00	29.75
July	14.65	10.44	14.13	13.50	15.06	12.15	13.16	12.44	11.00	12.06	10.55	9.00	9.15	14.94	37.75	29.75
August	14.19	11.13	15.45	14.50	14.40	12.69	14.44	11.94	11.10	12.50	10.62	8.94	10.44	15.30	33.70	29.75
September	14.06	11.85	16.31	16.13	14.38	13.44	15.35	11.94	10.94	13.13	10.19	8.37	11.00	16.38	35.50	29.75
October	13.55	12.50	17.00	17.50	14.60	13.60	15.94	11.75	10.44	14.25	9.60	7.87	11.19	17.50	28.75	30.36
November	12.00	15.44	17.50	18.00	12.32	14.38	15.31	11.94	10.20	13.50	9.00	7.56	12.94	21.00	30.90	28.68
December	10.00	17.55	18.00	17.25	11.00	14.83	14.75	11.65	10.75	13.06	8.50	7.90	15.38	25.13	31.25	24.62

Heavy Cast Scrap, per Net Ton

January	$17.30	$10.50	$13.81	$14.70	$17.80	$12.95	$13.06	$14.88	$12.19	$11.25	$12.90	$10.20	$9.19	$13.31	$15.50	$25.90
February	16.63	11.38	13.13	13.50	18.25	13.00	12.75	14.88	12.13	11.25	12.69	10.87	9.00	12.81	15.37	26.06
March	18.13	12.00	13.40	12.75	19.50	12.12	12.19	14.50	12.25	11.31	12.50	10.37	9.00	13.45	16.90	27.25
April	17.80	11.13	13.81	12.94	18.88	12.05	12.60	13.69	11.81	12.06	12.44	10.25	9.00	12.88	20.43	27.12
May	16.75	10.25	12.50	13.40	18.55	11.50	13.31	13.13	11.00	12.20	11.60	10.06	9.00	12.56	23.20	26.70
June	14.63	8.80	12.40	13.50	18.94	12.00	13.81	13.00	10.75	11.81	10.63	9.75	9.00	11.75	30.00	27.12
July	14.20	8.94	13.38	13.50	18.44	12.15	13.44	13.00	10.50	11.75	10.70	9.65	9.25	11.50	29.25	28.06
August	14.00	9.88	13.20	14.00	16.75	12.75	14.06	12.75	10.55	12.15	10.87	9.50	9.62	11.50	24.20	29.10
September	13.00	10.70	13.38	15.38	16.81	12.88	14.75	12.75	10.10	12.81	10.62	9.19	10.10	12.13	23.75	30.00
October	12.40	10.05	13.63	15.90	16.25	13.25	15.63	12.50	10.25	14.20	10.40	9.00	10.50	13.50	20.50	30.36
November	11.63	12.69	14.30	17.50	14.00	13.75	15.12	12.50	10.35	13.50	10.06	8.56	12.13	15.55	22.00	28.87
December	10.50	14.15	15.00	17.50	13.00	13.92	14.75	12.30	11.00	13.25	9.83	9.00	13.75	16.25	23.50	25.75

Railroad Malleable Scrap, per Net Ton

January	$16.25	$8.25	$14.06	$15.00	$17.20	$10.40	$12.88	$15.00	$10.94	$10.88	$13.40	$9.25	$8.13	$13.81	$17.75	$26.80
February	16.25	9.50	13.69	14.25	16.00	11.31	12.38	14.69	10.50	10.30	13.00	10.38	8.00	13.33	17.31	26.80
March	16.25	10.00	13.44	13.00	16.25	10.00	11.50	14.50	11.00	10.44	13.00	9.56	7.94	13.95	17.95	27.89
April	16.45	10.00	13.25	13.38	16.38	10.10	11.25	13.69	11.00	11.19	13.19	9.15	8.00	13.89	20.37	28.25
May	15.88	9.38	12.38	13.50	16.25	9.81	12.38	12.94	10.38	11.55	12.10	9.13	8.14	13.44	23.30	29.30
June	15.00	8.20	11.90	13.50	17.50	10.25	12.94	12.20	10.10	11.75	11.06	9.00	8.13	11.73	31.62	29.50
July	15.00	8.25	12.31	13.38	16.75	11.40	12.75	11.25	10.00	11.75	10.60	9.00	8.90	11.63	30.12	29.71
August	14.50	8.44	13.15	13.60	16.00	12.06	13.69	11.00	10.05	12.05	10.38	8.88	10.00	11.25	29.70	30.36
September	13.75	9.20	14.19	15.00	16.00	12.38	15.15	11.20	10.00	12.56	10.19	8.25	10.25	11.50	30.75	30.36
October	13.30	9.88	14.25	15.13	16.20	12.45	15.25	11.00	9.69	13.75	9.65	7.90	10.25	12.38	25.25	30.36
November	10.25	11.80	14.55	17.30	12.25	13.44	15.13	11.25	9.50	13.56	9.31	7.75	11.38	16.00	25.60	29.18
December	8.70	13.56	15.00	18.00	10.50	13.70	14.95	11.25	10.06	13.50	9.00	7.95	13.75	18.00	27.35	22.75

Frogs, Switches and Guards, Cut Apart, per Gross Ton

January	....	....	$14.88	$15.00	$17.40	$11.40	$14.00	$16.00	$11.50	$10.50	$12.65	$9.30	$9.19	$15.50	$21.60	$30.00
February	....	....	14.06	14.75	16.25	12.38	13.56	15.50	11.88	10.50	12.13	10.50	9.86	14.75	21.69	29.75
March	....	....	14.50	13.70	16.50	11.69	12.50	15.00	12.10	10.88	12.13	9.81	9.63	16.50	23.70	29.87
April	....	....	14.25	13.50	16.50	11.50	12.55	14.50	11.63	11.38	12.44	9.90	9.15	16.50	26.75	29.00
May	....	....	13.31	13.70	16.90	11.56	13.44	13.69	10.38	11.80	11.30	9.69	9.38	15.94	28.70	29.00
June	....	....	12.10	13.13	17.25	11.63	14.50	13.15	10.20	11.88	10.44	9.69	9.44	14.63	36.50	29.00
July	....	....	12.75	13.25	16.81	12.30	14.15	12.38	10.44	11.56	10.50	9.75	10.45	14.50	33.00	29.00
August	....	....	13.15	14.30	15.50	14.00	14.88	12.25	10.70	11.95	10.56	9.69	11.56	15.25	29.60	29.00
September	....	....	14.38	16.63	15.50	13.63	15.95	12.25	10.38	12.63	10.19	9.19	11.75	16.06	31.25	29.00
October	....	....	14.50	17.13	15.30	13.85	16.63	12.25	9.94	13.75	10.00	8.75	11.75	16.81	26.00	29.00
November	....	$13.25	15.40	18.30	12.69	14.50	16.06	12.25	9.65	13.44	9.56	8.19	13.44	20.95	27.60	28.00
December	....	14.38	15.50	18.00	11.63	14.95	16.00	12.10	10.13	12.63	9.00	8.40	15.63	23.25	28.37	22.75

Old Carwheels, per Gross Ton

January	$24.00	$13.26	$16.56	$19.00	$24.90	$20.10	$15.75	$18.38	$13.00	$13.25	$16.95	$11.65	$9.94	$14.63	$18.87	$30.00
February	24.00	14.13	16.38	19.00	23.50	16.94	15.25	17.88	13.00	13.05	16.75	12.44	10.00	13.94	18.25	30.00
March	24.00	14.50	15.75	18.60	23.88	15.50	14.69	17.00	13.25	13.00	16.75	11.88	9.94	14.30	20.25	30.00
April	24.00	14.00	15.88	18.75	25.00	14.00	14.50	16.50	13.25	13.25	16.75	11.55	9.75	13.88	23.62	29.00
May	22.88	13.13	14.81	19.00	25.20	12.88	14.81	15.75	12.75	13.90	15.05	11.50	9.75	12.95	27.35	29.00
June	21.75	11.20	14.25	18.00	25.38	13.00	15.81	15.50	12.55	14.13	13.94	11.50	10.19	12.44	39.00	29.00
July	21.50	10.63	14.38	18.00	24.25	13.30	16.00	14.81	12.50	13.88	12.90	11.25	11.30	12.50	35.25	29.00
August	21.38	11.13	14.95	18.50	24.50	15.50	16.25	14.50	12.85	13.70	12.75	11.25	11.04	11.60	30.40	29.00
September	20.25	11.10	15.75	19.75	24.50	15.50	18.05	14.00	12.81	14.38	12.63	11.06	11.80	11.69	31.87	29.00
October	18.00	12.00	16.00	19.31	24.38	15.25	18.31	14.00	12.50	16.00	12.10	10.65	12.00	12.94	25.75	29.00
November	15.75	14.25	17.10	22.60	23.13	15.50	18.50	13.50	12.10	16.69	12.00	9.81	13.31	17.30	28.15	29.00
December	13.00	16.25	18.75	25.00	22.00	16.00	18.50	13.50	13.06	16.75	11.88	9.60	14.56	21.25	31.00	26.75

Foundry Iron Prices, Cincinnati and Chicago

The tables given below show the average monthly prices of No. 2 Southern foundry pig iron at Cincinnati from 1880 to 1918, inclusive, and No. 2 local foundry pig iron at Chicago from 1889 to 1918.

Southern No. 2 Foundry Pig Iron at Cincinnati, per Gross Ton

	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892
January	$37.75	$22.50	$25.50	$21.62	$17.25	$15.62	$17.00	$20.12	$18.62	$14.75	$18.05	$13.81	$13.75
February	41.12	22.50	25.50	21.50	17.00	15.25	17.00	21.00	19.00	14.37	17.75	13.75	13.62
March	38.12	22.50	24.90	20.60	17.75	14.62	17.00	21.00	18.50	14.50	16.00	14.00	13.10
April	33.50	22.50	23.50	20.62	17.87	15.15	17.00	21.00	17.75	14.25	14.31	13.75	13.00
May	26.25	22.25	23.00	20.25	17.25	15.00	16.37	20.50	16.75	14.00	14.25	14.00	12.81
June	23.25	22.00	22.00	19.50	17.25	15.25	16.12	19.40	15.75	13.68	14.75	13.75	12.81
July	22.60	21.50	22.25	19.00	16.62	14.81	15.37	19 50	15 50	14.12	14 75	13 75	12.40
August	24.00	21.50	22.60	18.50	16.00	14.87	15.25	20.00	15.80	14.50	14.75	13.50	12.17
September	24.00	21.75	22.62	18.50	15.87	15.00	16.75	20.00	16.50	14.50	14.25	13.50	12.00
October	23.50	22.00	22.37	18.50	16.25	15.00	17.00	19.75	16.50	15.31	14.25	13.75	12.25
November	22.00	24.50	22.00	18.50	16.18	15.50	17.75	19.50	15.65	16.62	14.25	14.00	12.50
December	22.25	25.00	22.00	18.37	16.25	16.37	18.60	18.87	15.50	17.56	14.00	13.75	12.50

	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905
January	$12.50	$11.00	$9.25	$11.20	$11.00	$9.50	$10.31	$20.69	$13.45	$14.55	$21.65	$12.37	$16.25
February	12.12	10.75	9.25	11.00	9.75	9.25	11.69	20.50	13.12	14.75	21.50	12.12	16.25
March	12.00	10.20	9.25	10.75	9.69	9.25	13.75	20.30	14.00	14.75	21.37	12.10	16.25
April	11.75	9.50	9.25	10.40	9.25	9.25	14.50	20.19	14.50	16.87	20.15	12.50	16.25
May	11.68	9.50	9.50	10.50	8.75	9.37	14.56	19.75	13.85	18.35	18.87	12.25	15.81
June	11.50	9.61	10.12	10.32	8.75	9.30	16.00	18.75	13.37	20.19	17.75	11.80	14.65
July	11.37	9.75	11.50	9.75	8.95	9.25	17.56	16.81	13.00	20.75	16.15	11.81	13.94
August	11.05	9.80	11.50	9.37	9.00	9.37	18.35	14.25	13.00	23.06	15.19	12.00	14.40
September	10.75	10.00	12.75	9.50	9.35	9.55	19.94	13.62	13.06	25.00	14.75	12.00	14.37
October	10.75	10.00	12.75	9.95	9.50	9.75	20.75	12.87	13.75	25.65	13.50	12.81	15.31
November	10.75	9.75	12.75	10.44	9.50	9.75	20.75	12.95	14.00	23.62	12.00	15.19	16.60
December	10.87	9.25	12.50	10.35	9.50	9.90	20.75	13.75	14.25	22.44	12.05	15.85	16.75

	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
January	$16.75	$26.00	$16.15	$16.25	$17.25	$14.25	$13.25	$16.95	$13.88	$12.40	$17.40	$26.10	$37.60
February	16.75	26.00	15.75	16.13	17.06	14.25	13.31	16.69	13.81	12.40	17.75	27.53	37.60
March	16.65	26.00	15.50	15.05	16.30	14.25	13.50	16.31	14.00	12.27	17.90	31.90	37.60
April	16.63	25.06	15.20	14.25	15.37	14.25	13.75	15.65	13.80	12.34	17.90	37.40	37.60
May	16.75	24.25	14.75	14.50	15.00	13.95	14.15	14.94	13.75	12.40	17.90	41.90	37.60
June	16.44	24.10	15.25	14.70	14.85	13.44	14.25	14.06	13.37	12.50	17.45	45.15	37.60
July	16.06	23.85	15.00	15.75	14.75	13.25	14.70	13.75	13.30	12.71	16.90	49.90	37.60
August	17.30	23.00	15.25	16.38	14.31	13.45	15.06	14.06	13.25	13.71	16.70	49.90	37.60
September	18.69	21.50	15.65	17.35	14.25	13.31	15.87	14.25	13.25	14.15	17.28	49.90	37.60
October	20.00	20.95	15.75	17.88	14.25	13.25	16.80	14.35	12.90	14.78	18.03	35.90	37.60
November	23.38	19.50	16.00	17.75	14.25	13.20	17.25	13.87	12.90	16.15	22.40	35.90	37.60
December	25.00	17.00	16.25	17.45	14.25	13.19	17.25	13.95	12.50	17.10	25.90	35.90	35.90

Local No. 2 Foundry Pig Iron at Chicago (at Furnace after 1907), per Gross Ton

	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903
January	$16.00	$19.50	$14.60	$14.50	$13.37	$12.50	$9.75	$13.55	$11.02	$11.35	$11.47	$23.85	$15.10	$16.25	$23.45
February	15.00	18.87	15.00	14.37	12.81	11.87	9.75	12.50	11.00	11.28	12.47	23.85	14.60	16.85	23.35
March	15.00	17.62	15.00	14.00	13.00	11.30	9.81	12.00	10.88	11.10	14.95	23.85	15.60	18.51	23.22
April	15.00	16.62	15.12	14.00	13.00	10.50	10.25	12.00	10.75	11.26	15.47	23.72	15.85	18.97	22.87
May	15.00	16.20	15.00	14.00	12.96	10.50	10.25	11.69	10.38	11.35	15.72	22.65	15.85	20.85	20.72
June	14.50	16.00	15.00	14.00	13.00	10.50	10.88	11.50	10.25	11.35	17.35	20.72	15.35	21.85	19.85
July	14.87	16.00	15.15	14.00	12.79	10.12	12.13	11.25	10.25	11.35	19.22	18.60	15.35	21.60	18.25
August	15.10	16.00	15.00	13.75	12.75	10.00	13.20	11.18	10.25	11.35	20.65	16.25	15.35	22.10	17.22
September	15.50	16.00	15.00	13.50	12.75	10.00	13.63	10.75	10.40	11.35	22.22	15.35	15.35	23.35	16.41
October	17.00	16.00	15.00	13.50	12.75	10.00	14.00	10.88	11.00	11.35	23.35	14.85	15.10	23.35	15.70
November	17.62	15.75	14.94	13.50	12.75	9.70	14.00	11.19	11.00	11.35	23.45	14.85	15.23	23.35	15.10
December	18.66	15.37	14.62	13.50	11.69	9.75	14.00	11.25	11.00	11.35	23.85	15.10	15.85	23.35	14.81

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
January	$14.47	$17.85	$19.60	$25.85	$18.45	$17.35	$19.00	$15.50	$14.00	$17.90	$13.80	$13.00	$18.50	$30.00	$33.00
February	13.91	17.85	19.41	25.85	18.16	16.75	19.00	15 50	14.00	17.31	14.00	13.00	18.50	31.25	33.00
March	14.05	17.80	19.35	26.10	17.85	16.50	18.30	15.50	14.00	17.25	14.25	12.95	18.70	35.40	33.00
April	14.35	17.60	19.10	26.35	17.73	16.50	17.50	15.00	14.00	17.06	14.25	13.00	19.00	39.25	33.00
May	13.85	17.60	18.90	26.85	17.63	16.50	17.06	15.00	14.50	16.15	14.06	13.00	19.00	43.80	33.00
June	13.70	17.00	18.54	26.60	17.73	16.50	16.75	15.00	14.50	15.63	13.69	13.00	19.00	50.37	33.00
July	13.60	16.47	18.60	25.55	17.55	17.00	16.56	14.87	14.70	14.70	13.75	13.00	19.00	55.00	33.00
August	13.60	16.60	19.45	24.85	17.35	17.13	16.50	14.50	15.37	15.00	13.69	13.44	18.40	55.00	33.00
September	13.85	16.60	20.16	24.10	17.05	18.70	16.40	14.50	16.00	15.00	13.31	13.90	18.13	54.50	33.00
October	14.10	17.66	21.48	22.45	16.85	19.00	16.00	14.46	17.00	15.00	12.94	14.63	19.63	33.00	34.00
November	15.98	19.15	24.70	20.66	17.10	19.00	16.00	14.09	17.75	14.88	12.56	17.13	25.80	33.00	34.00
December	16.95	19.60	25.85	18.80	17.35	19.00	16.00	14.00	18.00	14.50	12.90	18.10	29.50	33.00	34.00

The Cincinnati prices given above date back to the earliest period for which Southern pig-iron quotations are available at that point. It may be said that these quotations represent almost the beginning of the Northern business in pig iron coming from the vicinity of Birmingham, Ala.

The Chicago prices also represent quotations from the beginning of the production of pig iron in the vicinity of Chicago for the merchant trade. For a long time these prices were quoted delivered on track near Chicago foundries, but beginning in 1908 prices were figured at the furnace, from which at that time a switching charge to local foundries of about 35 cents per ton applied. At the present time the switching charge averages about 50 cents.

Mahoning and Shenango Foundry Iron Prices

In the following table are presented the monthly average prices of No. 2 foundry pig iron at Valley furnace, namely, at furnaces in the Mahoning Valley, Ohio, and the Shenango Valley, Pennsylvania, from 1901 to 1918, inclusive, averaged from weekly quotations in THE IRON AGE in dollars per ton of 2240 lb.

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
January	$13.20	$15.60	$22.30	$13.00	$16.12	$17.31	$24.60	$16.80	$15.44	$17.00	$13.75	$13.00	$17.50	$12.85	$13.00	$18.50	$31.00	$33.00
February	13.16	16.20	21.95	12.47	16.00	17.25	24.12	16.00	15.05	16.69	13.75	13.00	17.00	13.19	13.00	18.31	32.00	33.00
March	13.97	17.76	22.00	12.91	16.00	17.12	24.00	15.56	14.50	16.10	13.75	13.12	16.69	13.25	13.00	18.50	34.75	33.00
April	14.10	19.30	20.99	13.01	16.00	16.50	24.00	15.15	14.00	15.62	13.75	13.25	15.55	13.25	12.75	18.50	39.75	33.00
May	14.10	19.92	20.32	12.47	15.55	16.30	25.00	14.87	14.19	15.31	13.75	13.25	14.62	13.00	12.94	18.20	42.40	33.00
June	13.66	20.60	19.37	11.96	14.81	16.19	25.12	15.00	14.90	14.75	13.56	13.25	14.06	13.00	12.69	18.13	50.25	33.00
July	13.20	21.10	18.02	11.67	14.25	16.44	22.80	14.80	15.19	14.31	13.50	13.37	13.87	13.00	12.70	18.25	54.50	33.00
August	12.97	22.35	16.34	11.87	14.15	17.71	22.50	14.50	15.31	14.15	13.50	13.69	14.00	13.00	13.62	18.25	53.20	33.00
September	13.10	22.30	14.98	11.71	14.56	19.56	20.87	14.47	15.75	13.75	13.44	14.44	14.00	13.00	14.70	18.39	47.00	33.00
October	13.60	22.17	14.09	12.50	15.51	21.35	19.80	14.36	17.12	13.94	13.37	16.10	13.84	12.90	14.87	20.00	33.00	34.00
November	14.81	23.25	13.32	14.60	16.83	23.87	19.00	15.25	17.25	13.90	13.20	16.94	13.50	12.75	15.50	25.00	33.00	34.00
December	15.20	21.25	13.22	16.19	17.35	24.00	17.37	15.50	17.00	13.75	13.00	17.25	13.50	12.75	18.30	30.75	33.00	34.00

L. S. Charcoal Pig-Iron Prices for 28 Years

The following table, which has been compiled from quotations in THE IRON AGE, gives the average monthly prices of Lake Superior charcoal pig iron per gross ton, in carload lots, at Chicago, from 1891 to 1918:

	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904
January	$18.50	$17.25	$16.50	$15.50	$13.00	$14.50	$13.50	$12.50	$11.50	$25.50	$19.00	$19.25	$25.60	$16.62
February	18.25	17.00	16.50	15.40	13.00	14.00	13.50	11.50	12.50	25.50	17.50	20.25	26.50	15.87
March	18.00	17.00	16.50	15.25	13.00	13.50	13.50	11.50	15.75	25.50	17.50	20 65	26.50	15.00
April	18.00	16.75	16.50	15.25	12.75	13.50	13.50	11.50	17.00	25.50	18.00	21.50	25.30	15.19
May	17.00	16.50	16.50	15.25	13.00	13.50	13.00	11.50	17.25	24.50	17.50	22.80	24.12	15.00
June	16.75	16.50	16.00	15.25	13.00	13.50	13.00	11.50	19.50	23.00	17.00	23.50	24.00	14.70
July	17.00	16.50	16.00	15.00	13.50	13.50	13.00	11.50	21.50	22.00	17.00	25.00	22.20	14.50
August	17.00	16.50	16.00	14.50	13.50	13.50	13.00	11.50	22.50	20.00	17.00	25.75	20.62	14.87
September	17.25	16.50	16.00	14.25	14.50	13.50	12.50	11.50	24.25	18.50	17.00	26.00	19.00	14.75
October	17.00	16.75	16.00	14.00	15.50	13.50	12.50	11.50	25.00	18.00	17.00	26.00	18.10	15.31
November	17.00	16.50	15.75	13.50	15.50	13.50	12.50	11.50	25.50	17.00	17.50	26 00	17.12	16.37
December	16.75	16.50	15.50	13.00	16.00	13.50	12.50	11.50	25.50	18.25	18.00	25.26	16.50	17.80

	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
January	$18.50	$20.40	$26.80	$22.50	$19.50	$19.50	$17.87	$16.00	$18.15	$15.25	$15.75	$19.50	$31.75	$37.50
February	18.50	20.13	27.00	21.38	19.50	19.50	17.50	15.95	18.00	15.25	15.75	19.75	33.75	37.50
March	18.50	19.75	26.75	21.25	19.50	19.30	17.50	15.75	18.00	15.25	15.75	19 75	36.75	37.50
April	18.50	19.44	26.50	20.30	19.50	19.00	17.50	15.75	18.00	15.45	15.75	19.75	40.25	37.50
May	17.75	19.05	27.40	20.00	19.50	18.62	17.25	15.75	18.00	15.75	15.75	19.75	48.15	37.50
June	17.00	19.00	27.50	20.00	19.50	18.50	16.80	16.75	16.81	15.75	15.75	19.75	52.88	37.62
July	16.50	19.06	27 00	20.00	19.50	18.50	16.50	16.25	15.65	15.75	15.75	19.75	57.75	38.00
August	16.40	19.35	27.20	19.50	19.50	18.50	16.50	16.25	14.69	15.75	16.00	19.75	58.00	38.00
September	16.87	20.13	27.00	19.50	19.50	18.40	16.50	17.12	15.25	15.75	15.85	19.75	58.00	38.00
October	18 25	21.50	26.20	19.50	19.50	18.12	16.50	18.65	15.25	15.75	15.75	20 25	37.50	38.00
November	19.20	24 63	25.12	19.50	19.50	18.00	16.50	18.65	15.25	15.75	17.00	26.46	37.50	38.70
December	20.00	26.13	24.25	19.50	19.50	18.00	16.37	18.75	15.25	15.75	18.65	31.75	37.50	38.70

Billet Prices at Pittsburgh for 32 Years

The table below gives the average monthly prices of 4 x 4 in. Bessemer steel billets at Pittsburgh from 1887 to 1918, inclusive. The prices are per gross ton and are averaged from weekly quotations in THE IRON AGE. Prior to 1886 steel billets were not a regular merchant commodity.

	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902
January	$24.50	$29.38	$28.15	$36.65	$25.60	$25.00	$21.56	$16.12	$14.90	$16.80	$15.42	$14.93	$16.62	$34.50	$19.75	$27.50
February	35.44	29.38	27.81	35.25	26.00	24.36	21.62	15.75	14.95	17.38	15.25	15.06	18.00	34.87	20.31	29.37
March	36.00	29.13	27.25	31.88	26.25	23.00	22.60	15.55	14.84	17.09	15.44	15.25	24.30	33.00	22.88	31.25
April	34.75	28.63	27.00	28.38	25.35	22.81	22.44	15.69	15.44	19.53	14.60	15.06	25.37	32.00	24.00	31.50
May	32.38	28.35	26.90	27.55	25.50	22.41	21.69	18.00	16.30	19.50	13.82	14.85	26.75	28.90	24.00	32.27
June	31.40	28.06	26.75	30.25	25.25	22.97	21.70	18.12	18.63	19.12	14.06	14.65	30.10	27.25	24.38	32.35
July	31.50	28.00	27.13	30.70	25.50	23.50	21.06	18.00	20.75	18.85	14.00	14.50	33.12	21.00	24.00	31.76
August	32.50	28.40	28.20	30.38	25.31	23.81	20.45	17.15	21.75	18.75	14.00	15.85	35.40	18.20	24.20	31.02
September	31.80	29.00	29.50	30.13	25.00	23.65	19.31	17.19	24.00	19.75	15.60	16.00	38.37	16.93	24.88	29.50
October	31.63	29.25	33.70	28.70	24.90	23.53	18.06	16.00	21.90	19.75	16.44	15.56	38.75	16.50	26.70	29.70
November	31 00	29.00	34.00	27.39	24.16	24.94	17.37	15.57	19.13	20.90	15.57	15.06	36.50	18.95	27.00	28.50
December	29.00	28.44	35.60	26.25	24.20	22.40	16.69	15.12	16.97	17.50	15.00	15.80	33.75	19.75	27.50	29.10

	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
January	$29.60	$23.00	$22.75	$26.25	$29.40	$28.00	$25.00	$27.50	$23.00	$20.00	$28.30	$20.13	$19.25	$32.00	$63.00	$47.50
February	29.87	23.00	23.50	26.50	29.50	28.00	25.00	27.50	23.00	20.00	28.50	21.00	19.50	33.50	65.00	47.50
March	30.62	23.00	24.00	26.70	29.00	28.00	23.00	27.50	23.00	19.75	28.50	21.00	19.70	42.40	66.25	47.50
April	30.25	23.00	24.00	27.00	30.12	28.00	23.00	26.75	23.00	20.00	28.50	20.80	20.00	45.00	73.75	47.50
May	30.37	23.00	23.50	26.40	30.30	28.00	23.00	26.12	22.60	20.80	27.60	20.00	20.00	45.00	86.00	47.50
June	28.87	23.00	22.00	26.63	29.62	25.75	23.00	25.30	21.00	20.87	26.50	19.50	20.50	43.50	98.75	47.50
July	27.60	23.00	22.00	27.25	30.00	25.00	23.50	25.00	21.00	21.50	26.60	19.00	21.38	41.00	100.00	47.50
August	27.00	23.00	24.00	27.80	29.25	25.00	24.13	24.62	21.00	22.12	26.00	20.25	23.13	44.20	86.00	47.50
September	27.00	20.00	25.00	28.00	29.37	25.00	25.00	24.40	20.75	23.62	24.87	21.00	24.10	45.00	66.25	47.50
October	27.00	19.50	25.62	28.00	28.20	25.00	26.25	23.75	20.00	26.00	23.30	20.00	24.63	46.25	49.38	47.50
November	24.00	20.25	26.00	28.88	28.00	25.00	27.13	23.30	19.50	27.00	21.00	19.25	26.50	52.00	47.50	47.50
December	23.00	21.20	26.00	29.50	28.00	25.00	27.50	23.00	19.25	27.00	20.00	19.00	30.25	57.50	47.50	45.50

Prices of Galvanized Sheets from 1898 to 1918

The table below gives the monthly average prices, f.o.b. Pittsburgh, in cents per pound, of galvanized sheets, as quoted in THE IRON AGE from the beginning of 1898 down to the present month. It was the custom, in marketing galvanized sheets, up to a comparatively recent period, to observe the usage in the hardware trade of maintaining a standard list for the several gages, and, in making prices, to name a discount from this list. It was therefore necessary, in compiling the greater part of this table, to convert discounts into net prices.

Average Prices of No. 28 Galvanized Sheets, at Pittsburgh, in Cents per Pound

	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
Jan.	3.12	3.08	3.83	4.36	4.64	3.70	3.36	3.35	3.45	3.67	3.59	3.55	3.50	3.20	2.90	3.46	2.87	2.79	4.75	6.25	6.25
Feb.	3.06	3.62	4.09	4.36	4.36	3.70	3.25	3.40	3.45	3.75	3.55	3.51	3.50	3.20	2.87	3.50	2.95	3.16	4.75	6.38	6.25
March	3.15	4.17	4.32	4.84	4.36	3.78	3.23	3.45	3.43	3.75	3.55	3.26	3.50	3.20	2.80	3.50	2.95	3.40	4.75	6.69	6.25
April	3.10	4.25	4.78	4.84	4.36	3.89	3.23	3.45	3.40	3.75	3.55	3.25	3.50	3.20	2.86	3.50	2.91	3.29	5.00	7.00	6.25
May	3.06	4.25	4.66	4.74	4.36	3.88	3.23	3.45	3.40	3.75	3.55	3.25	3.50	3.20	2.90	3.42	2.80	3.50	4.94	8.20	6.25
June	3.06	4.52	4.59	4.59	4.23	3.81	3.18	3.35	3.55	3.75	3.55	3.25	3.50	3.00	2.90	3.38	2.75	4.28	4.69	9.50	6.25
July	3.06	4.72	4.53	4.48	4.26	3.73	3.14	3.36	3.55	3.75	3.55	3.25	3.39	3.00	3.00	3.33	2 75	4.40	4.28	10.00	6.25
Aug.	3.10	4.85	4.42	4.74	4.18	3.66	3.14	3.32	3.55	3.75	3.55	3.25	3.30	2.99	3.12	3.24	2.85	3.71	4.21	10.00	6.25
Sept.	3.15	4.59	4.33	4.73	3.99	3.66	3.14	3.30	3.55	3.75	3.55	3.28	3.21	2.93	3.21	3.16	2.95	3.56	4.18	9.75	6.25
Oct.	3.15	4.53	4.25	4.55	3.87	3.73	3.14	3.30	3.58	3.75	3.55	3.35	3.20	2.85	3.36	3.08	2.95	3.50	4.41	...	6.25
Nov.	3.06	4.21	4.16	4.84	3.85	3.51	3.23	3.32	3.65	3.75	3.55	3.43	3.20	2.85	3.40	2.98	2.88	3.89	5.18	6.25	6.25
Dec.	3.06	3.88	4.36	4.84	3.78	3.40	3.31	3.35	3.65	3.75	3.55	3.50	3.19	2.89	3.40	2.90	2.78	4.75	6.00	6.25	6.15

The highest prices realized for galvanized sheets, aside from the war peak in 1917, were obtained in April, 1916, following the spectacular performances of spelter, when prices of that metal soared to an unprecedented height. At that time, No. 28 galvanized sheets sold up to 5.30c. per lb., Pittsburgh, or higher, although the average for the month is placed, in the table, at 5c. It is interesting to know that in 1901, in a period of great activity in the steel trade, No. 28 galvanized sheets were regularly quoted at 5.10c., Pittsburgh, for two weeks, namely, the first half of September. The lowest price realized, as shown by the table, was 2.75c., Pittsburgh, which price ruled in June and July, 1914. The price did not run below 3c., Pittsbugh, in the years covered in this table until 1911, although in 1893 it dipped close to that level.

Metal, Tin-Plate and Sheet Prices for Twenty-one Years

Monthly Averages Computed from the Weekly Market Quotations of "The Iron Age" in the Period of 1898-1918

(With Supplement)

The accompanying supplement shows by plotted lines the fluctuations in prices of the more important metals, tin plate and sheets in the period from 1898 to 1918, inclusive. The prices used for this purpose are the computed monthly averages of the prices of carloads, at New York, for metals and at Pittsburgh for tin plate and No. 28 galvanized and black sheets, given in the metal market reports of THE IRON AGE week by week. The columns of figures alongside the chart give the values. The column nearest the chart gives tin in cents per pound; the middle column, copper and spelter in cents per pound, and the outside column represents lead and sheets in cents per pound and tin plate in dollars per base box. The following tables give the monthly averages on which the chart is based, except for galvanized sheets, the table for which will be found on page 25.

Lake Copper, at New York, in Cents per Pound

	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
Jan.	11.00	14.02	16.21	16.90	11.45	12.13	12.62	15.18	18.78	24.41	13.90	14.56	14.00	12.81	14.50	16.98	14.85	14.02	24.39	29.73	23.50
Feb.	11.10	17.66	16.25	16.97	12.47	12.80	12.34	15.25	17.94	25.10	13.13	13.37	13.78	12.75	14.41	15.55	15.00	15.21	26.85	34.90	23.50
March	11.95	17.55	16.41	17.00	12.12	14.31	12.60	15.25	18.50	23.38	12.85	12.90	13.75	12.58	14.88	15.05	14.79	15.75	27.10	35.85	23.50
April	12.05	18.56	17.00	17.00	11.97	14.85	13.19	15.18	18.62	24.62	13.09	12.94	13.31	12.41	16.00	15.67	14.75	18.90	28.27	21.67	23.50
May	12.04	18.65	16.80	17.00	12.10	14.75	13.28	15.00	18.70	24.10	12.88	13.21	13.06	12.33	16.30	15.91	14.40	21.00	28.88	31.42	23.50
June	11.85	18.20	16.31	17.00	12.23	14.56	12.74	15.00	18.69	23.94	13.00	13.50	12.88	12.71	17.53	15.42	14.12	22.38	27.82	32.46	23.50
July	11.59	18.37	16.31	16.97	11.94	13.73	12.62	15.03	18.47	21.95	13.00	13.34	12.66	12.78	17.54	14.78	13.70	21.98	25.84	28.78	25.80
Aug.	11.85	18.50	16.55	16.50	11.59	13.35	12.50	16.07	18.65	18.94	13.71	13.56	12.93	12.75	17.73	15.86	12.85	19.33	26.95	27.24	26.00
Sept.	13.25	18.47	16.75	16.50	11.60	13.58	12.67	16.12	19.31	16.41	13.80	13.50	12.81	12.65	17.77	16.77	12.66	17.97	28.03	24.90	26.00
Oct.	12.37	18.03	16.73	16.71	11.71	13.42	13.09	16.62	21.81	13.80	13.81	13.19	12.84	12.53	17.80	16.85	11.73	17.89	28.48	23.50	26.00
Nov.	12.69	17.00	16.75	16.82	11.44	13.25	14.22	16.90	22.50	13.94	14.44	13.44	12.98	12.80	17.70	16.16	12.00	18.92	32.32	23.50	26.00
Dec.	12.79	16.69	16.87	14.71	11.61	12.30	14.87	18.75	23.06	13.48	14.53	13.80	13.00	13.84	17.69	14.88	13.35	20.24	33.38	23.50	26.00

Spelter, at New York, in Cents per Pound

Jan.	3.75	4.90	4.55	4.08	4.28	4.82	4.95	6.17	6.48	6.90	4.54	5.15	6.26	5.55	6.52	7.15	5.29	6.59	18.19	9.94	7.88
Feb.	3.79	5.68	4.69	3.94	4.18	5.00	4.95	6.12	6.09	7.00	4.78	4.99	5.89	5.56	6.71	6.45	5.40	8.84	20.13	10.48	7.99
March	4.00	5.99	4.60	3.89	4.29	5.36	5.05	6.06	5.96	6.92	4.76	4.81	5.72	5.65	6.98	6.26	5.28	9.29	18.40	10.77	7.64
April	4.00	6.25	4.71	3.94	4.41	5.65	5.22	5.97	6.05	6.81	4.68	4.94	5.60	5.51	6.86	5.77	5.18	11.22	18.58	9.85	7.01
May	3.95	6.72	4.52	3.97	4.50	5.75	5.14	5.55	5.95	6.51	4.60	5.12	5.20	5.50	6.86	5.47	5.06	16.14	15.86	9.46	7.32
June	4.65	6.02	4.27	3.95	4.88	6.00	4.79	5.32	6.14	6.45	4.56	5.39	5.19	5.63	6.99	5.18	5.09	22.18	12.75	9.62	8.01
July	4.51	5.79	4.24	3.90	5.23	5.95	4.85	5.38	5.98	6.15	4.46	5.35	5.20	5.79	7.26	5.38	5.02	20.58	9.83	8.95	8.69
Aug.	4.35	5.55	4.17	3.92	5.46	5.94	4.85	5.66	6.06	5.71	4.71	5.74	5.26	6.04	7.19	5.75	5.60	14.11	8.98	8.69	8.96
Sept.	4.62	5.40	4.10	4.02	5.45	6.00	5.06	5.83	6.19	5.28	4.76	5.85	5.53	6.03	7.53	5.82	5.50	14.16	8.22	8.34	9.60
Oct.	4.61	5.37	4.10	4.20	5.48	6.05	5.17	6.05	6.18	5.45	4.81	6.09	5.69	6.20	7.57	5.42	4.97	13.96	9.98	8.24	9.11
Nov.	5.09	4.64	4.20	4.32	5.29	5.68	5.49	6.17	6.36	5.10	5.03	6.32	5.95	6.60	7.48	5.29	5.12	17.15	11.90	7.95	8.70
Dec.	5.13	4.68	4.19	4.35	4.91	5.15	5.80	6.50	6.62	4.39	5.17	6.35	5.80	6.44	7.33	5.18	5.71	16.69	11.13	7.75	8.51

Lead, at New York, in Cents per Pound

Jan.	3.66	4.02	4.70	4.37	4.02	4.10	4.39	4.56	5.86	6.30	3.73	4.19	4.70	4.50	4.41	4.35	4.11	3.74	5.93	7.69	6.87
Feb	3.69	4.53	4.70	4.37	4.10	4.10	4.40	4.50	5.56	6.31	3.75	4.07	4.63	4.46	4.00	4.35	4.06	3.82	6.23	9.13	7.04
March	3.71	4.37	4.70	4.37	4.10	4.44	4.50	4.45	5.35	6.31	3.88	4.02	4.51	4.41	4.08	4.35	3.97	4.04	7.43	9.47	7.24
April	3.61	4.30	4.70	4.37	4.10	4.59	4.50	4.50	5.39	6.16	4.02	4.19	4.40	4.44	4.20	4.40	3.82	4.20	7.73	9.43	6.95
May	3.64	4.42	4.22	4.37	4.10	4.37	4.48	4.50	5.90	6.02	4.26	4.32	4.37	4.40	4.20	4.37	3.90	4.25	7.45	11.60	6.88
June	3.86	4.45	3.90	4.37	4.10	4.25	4.22	4.51	5.94	5.75	4.45	4.36	4.38	4.46	4.50	4.35	3.90	5.89	6.87	11.68	7.55
July	3.95	4.55	4.03	4.37	4.10	4.12	4.17	4.56	5.80	5.24	4.50	4.35	4.40	4.50	4.67	4.37	3.90	5.59	6.34	10.72	8.04
August	3.99	4.56	4.26	4.37	4.10	4.12	4.15	4.64	5.78	5.12	4.59	4.36	4.40	4.50	4.54	4.64	3.87	4.68	6.26	10.72	8.05
Sept.	3.99	4.60	4.36	4.37	4.10	4.26	4.20	4.85	5.92	4.84	4.54	4.39	4.40	4.49	5.04	4.73	3.86	4.62	6.88	8.84	8.05
Oct.	3.81	4.59	4.37	4.37	4.10	4.40	4.20	5.07	5.94	4.64	4.34	4.39	4.40	4.31	5.06	4.52	3.52	4.60	7.00	6.77	8.05
Nov.	3.70	4.58	4.37	4.37	4.10	4.25	4.51	5.48	5.97	4.45	4.39	4.40	4.44	4.31	4.66	4.33	3.68	5.16	7.13	6.44	8.05
Dec.	3.62	4.65	4.37	4.19	4.10	4.19	4.60	5.96	6.19	3.76	4.24	4.56	4.50	4.45	4.32	4.06	3.80	5.33	7.60	6.50	6.90

Tin, at New York, in Cents per Pound

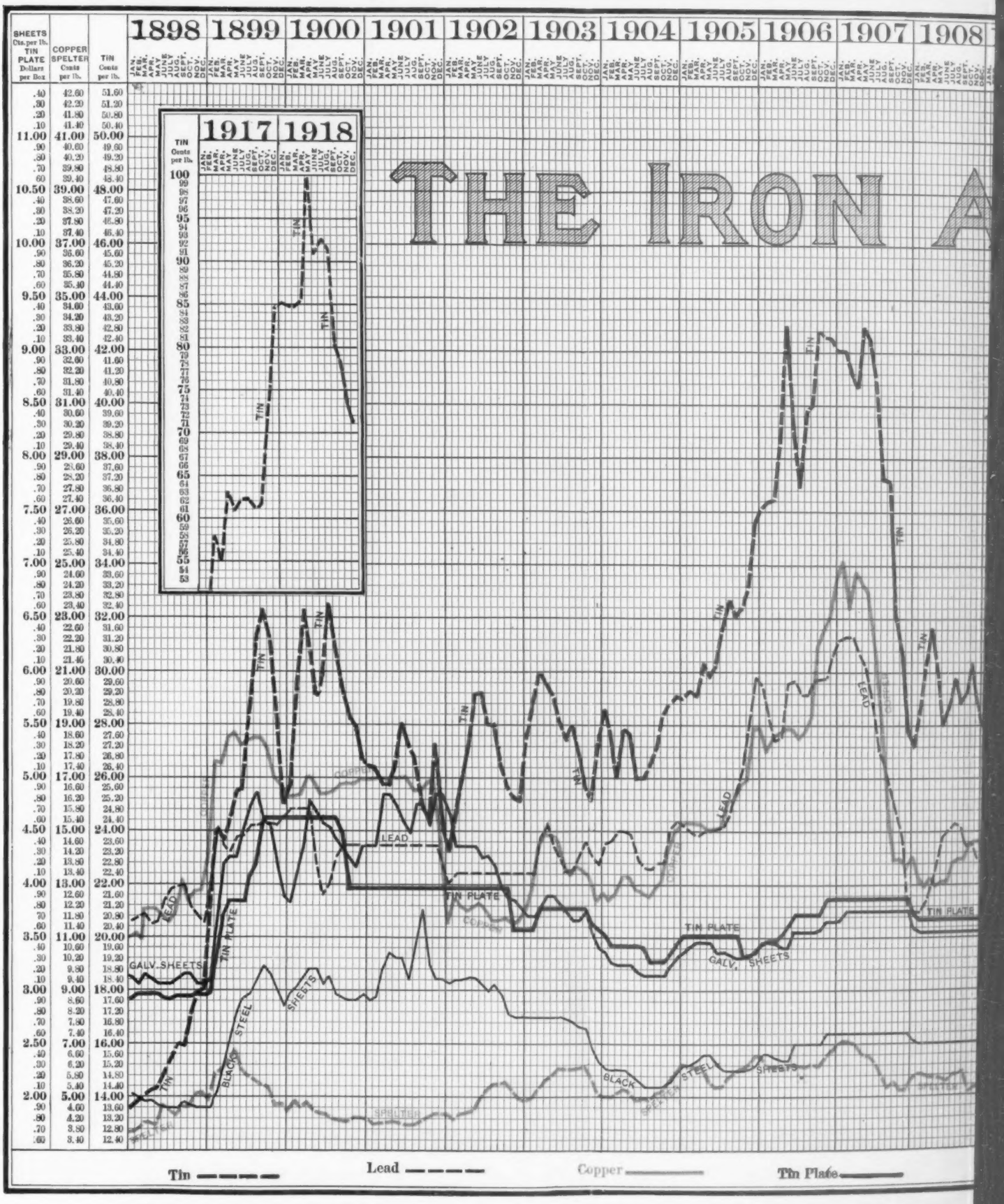
Jan.	13.77	22.12	26.00	26.60	23.38	27.76	28.75	29.18	36.36	42.14	27.43	28.19	32.61	41.20	44.58	50.34	39.12	34.13	41.76	44.10	85.13
Feb.	14.04	24.25	29.71	26.55	24.73	29.14	27.98	29.49	36.48	42.16	28.74	28.44	32.65	43.34	43.56	48.71	39.82	37.25	42.60	51.47	85.00
March	14.26	23.86	32.42	25.95	26.16	30.06	26.19	29.21	36.62	41.29	30.46	28.75	32.51	41.10	42.76	46.93	38.03	48.73	50.53	58.38	85.00
April	14.41	24.82	30.85	25.94	27.29	29.69	27.99	30.43	38.86	40.84	31.79	29.35	32.83	42.05	43.64	49.04	36.10	47.64	51.51	55.82	88.53
May	14.54	25.61	29.25	26.82	29.26	39.26	27.76	30.04	43.08	43.01	29.84	29.07	33.05	43.32	45.98	49.06	33.21	38.79	49.14	63.21	100.00
June	15.05	25.69	30.00	28.22	29.29	28.30	26.14	30.36	38.97	42.65	28.18	29.26	32.79	46.25	47.44	45.01	30.60	40.26	42.07	61.93	91.00
July	15.60	28.72	32.76	27.41	28.28	27.60	26.28	31.71	37.18	41.15	28.92	29.05	32.99	43.23	44.70	41.32	35.65	37.38	38.25	62.61	93.00
Aug.	16.14	31.40	31.13	26.90	28.14	28.00	26.74	32.85	39.90	37.35	29.99	29.96	33.92	43.38	45.86	41.63	48.34	34.37	38.88	62.53	91.33
Sept.	16.02	32.40	29.63	25.04	26.55	27.06	27.27	32.21	40.32	37.22	28.91	30.00	35.17	39.69	49.16	42.63	31.13	33.13	38.65	61.54	80.40
Oct.	17.25	31.35	28.46	24.62	25.76	25.83	28.53	32.47	42.90	32.33	29.44	30.41	36.76	41.23	50.07	40.38	30.25	33.05	41.10	62.24	78.82
Nov.	18.07	28.52	28.10	27.47	25.43	25.35	29.00	33.46	42.70	30.81	30.43	30.74	37.38	43.08	49.87	39.75	33.28	39.50	44.12	74.18	73.67
Dec.	18.20	25.19	26.84	24.39	25.33	27.53	29.27	35.84	42.62	27.92	29.13	32.91	38.21	45.03	49.86	37.12	34.01	38.53	42.66	85.00	71.42

Tin Plate, at Pittsburgh, in Dollars per Box

Jan.	$2.95	$3.00	$4.65	$4.00	$4.00	$3.60	$3.56	$3.55	$3.47	$3.90	$3.74	$3.70	$3.60	$3.60	$3.40	$3.60	$3.32	$3.10	$3.75	$7.00	$7.75
Feb.	2.90	3.38	4.65	4.00	4.00	3.60	3.45	3.55	3.50	3.90	3.70	3.70	3.60	3.67	3.35	3.60	3.29	3.10	3.96	7.38	7.75
March	3.00	3.75	4.65	4.00	4.00	3.80	3.45	3.55	3.50	3.90	3.70	3.53	3.60	3.70	3.30	3.60	3.30	3.25	4.19	8.00	7.75
April	3.00	3.87	4.65	4.00	4.00	3.80	3.45	3.55	3.57	3.90	3.70	3.40	3.60	3.70	3.30	3.60	3.30	3.25	4.50	8.00	7.75
May	3.00	3.87	4.65	4.00	4.00	3.80	3.45	3.55	3.66	3.90	3.70	3.40	3.60	3.70	3.33	3.60	3.30	3.15	5.30	8.40	7.75
June	2.99	3.87	4.65	4.00	4.00	3.80	3.45	3.55	3.75	3.90	3.70	3.40	3.60	3.70	3.40	3.60	3.30	3.11	5.81	10.50	7.75
July	2.94	4.12	4.65	4.00	4.00	3.80	3.41	3.55	3.75	3.90	3.70	3.40	3.60	3.70	3.43	3.60	3.27	3.10	6.00	12.00	7.75
Aug.	2.93	4.23	4.65	4.00	4.00	3.80	3.30	3.55	3.75	3.90	3.70	3.40	3.60	3.70	3.50	3.55	3.41	3.10	5.95	11.40	7.75
Sept.	2.98	4.65	4.50	4.00	4.00	3.80	3.30	3.55	3.75	3.90	3.70	3.40	3.60	3.67	3.58	3.50	3.35	3.15	5.75	12.00	7.75
Oct.	2.98	4.65	4.00	4.00	4.00	3.80	3.30	3.34	3.75	3.90	3.70	3.50	3.60	3.52	3.60	3.50	3.24	3.15	5.81	.....	.....
Nov.	2.98	4.65	4.00	4.00	3.60	3.65	3.39	3.34	3.90	3.90	3.70	3.56	3.60	3.40	3.60	3.40	3.15	3.28	5.97	7.75	7.75
Dec.	3.00	4.65	4.00	4.00	3.60	3.60	3.47	3.40	3.90	3.90	3.70	3.60	3.60	3.40	3.60	3.40	3.13	3.52	6.63	7.75	7.55

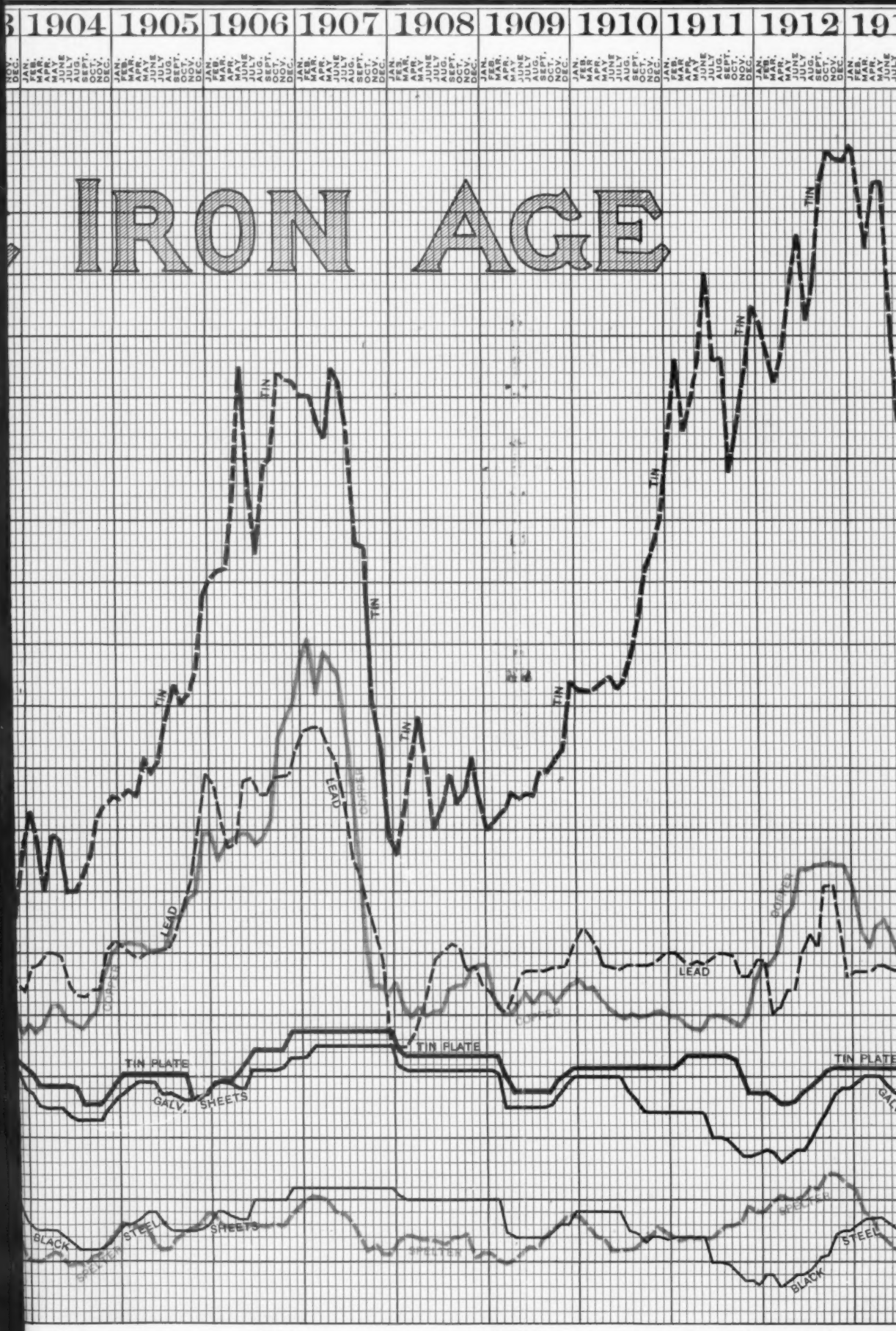
No. 28 Black Sheets, at Pittsburgh, in Cents per Pound

Jan.	2.02½	1.92½	2.97½	2.90	3.07½	2.75	2.29	2.30	2.40	2.60	2.52	2.50	2.40	2.20	1.90	2.31	1.87	1.80	2.60	4.50	5.00
Feb.	2.00	2.05	3.03	2.93¾	3.10	2.75	2.27½	2.30	2.40	2.60	2.50	2.50	2.40	2.20	1.87	2.35	1.95	1.80	2.60	4.69	5.00
March	1.96	2.36	3.10	3.22½	3.10	2.75	2.27	2.34	2.38	2.60	2.50	2.25	2.40	2.20	1.80	2.35	1.95	1.80	2.71	4.94	5.00
April	1.97½	2.60	3.20	3.35	3.12½	2.75	2.25	2.40	2.35	2.60	2.50	2.20	2.40	2.20	1.86	2.35	1.91	1.80	2.85	5.75	5.00
May	1.92½	2.78¾	3.20	3.30	3.10	2.75	2.20	2.40	2.35	2.60	2.50	2.20	2.40	2.20	1.90	2.30	1.85	1.79	2.89	7.00	5.00
June	1.90	2.93	3.05	3.30	3.05	2.75	2.16	2.30	2.50	2.60	2.50	2.20	2.40	2.00	1.90	2.27	1.81	1.75	2.90	7.88	5.00
July	1.90	2.97½	3.14¾	3.10	3.00	2.73¾	2.10	2.26	2.50	2.60	2.50	2.20	2.23¾	2.00	1.95	2.25	1.80	1.75	2.90	8.50	5.00
Aug.	1.90	3.08	2.98	3.41	3.05	2.70	2.10	2.26	2.50	2.60	2.50	2.20	2.21	1.99	2.02	2.21	1.86	1.85	2.90	8.50	5.00
Sept.	1.96	3.22½	2.93¾	3.77½	2.97½	2.65	2.10	2.25	2.50	2.60	2.50	2.26	2.15	1.91	2.07	2.14	1.95	1.90	2.93	8.50	5.00
Oct.	1.92	3.15	2.90	3.23	2.79	2.62	2.10	2.25	2.50	2.60	2.50	2.30	2.20	1.85	2.21	2.04	1.94	2.03	3.23	....	5.05
Nov.	1.90	3.00	2.89	3.10	2.75	2.49	2.12½	2.27	2.60	2.60	2.50	2.30	2.20	1.85	2.25	1.97	1.87	2.25	3.65	5.00	5.00
Dec.	1.90	2.87½	2.96	3.10	2.75	2.32	2.22	2.30	2.60	2.60	2.50	2.40	2.19	1.83¾	2.25	1.89	1.82	2.50	4.31	5.00	4.85



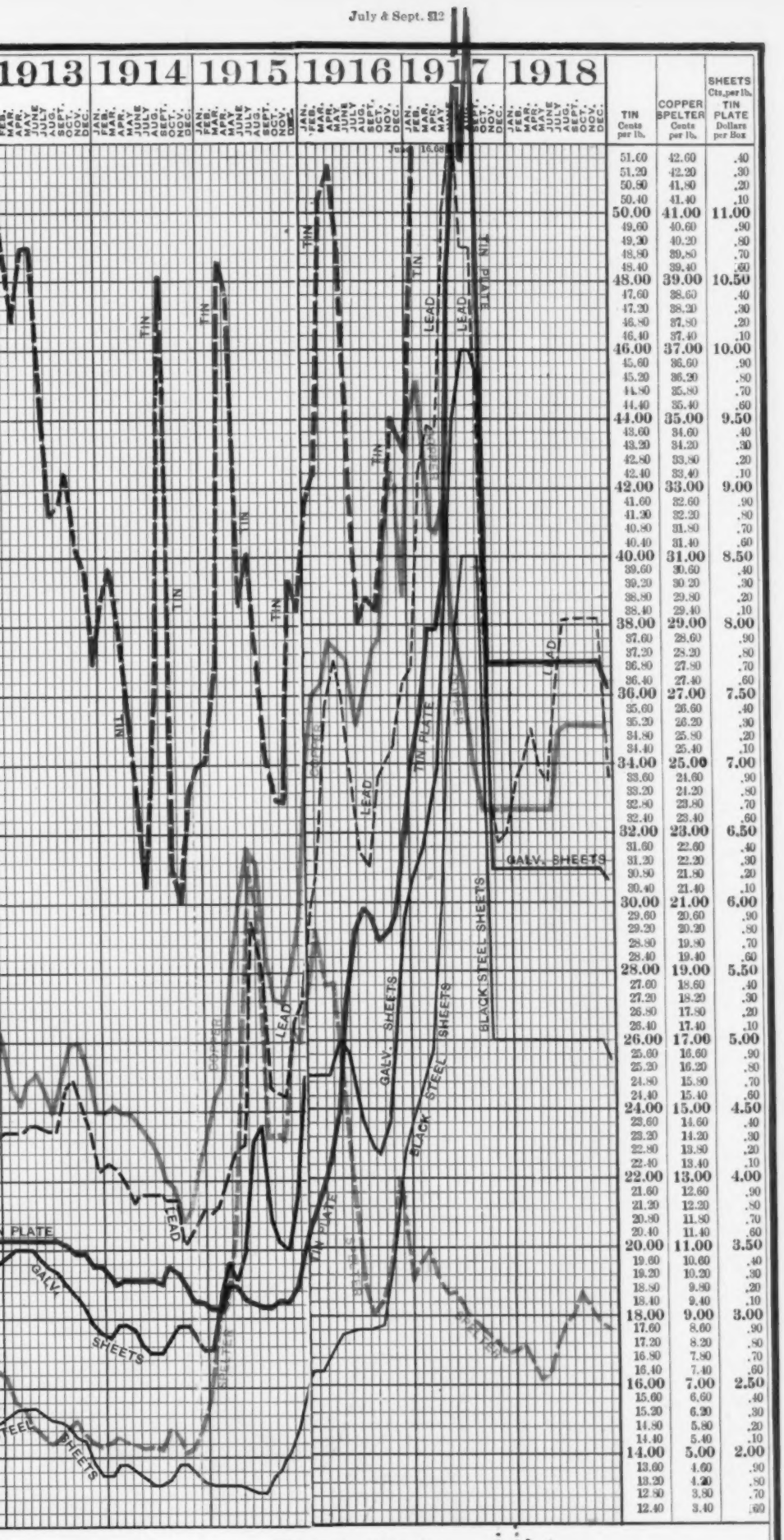
Fluctuations in Carload Prices of Lake Copper, Lead, Tin and Spelter in Pittsburgh from January 1,

NOTE—To enable the great advances in prices of copper and spelter in 1915, 1916, 1917, and 1918, to be completely shown in the curves is less than in the ca



Copper, Lead, Tin and Spelter in New York and Tin Plate and Pittsburgh from January 1, 1898, to January 1, 1919

in 1915, 1916, 1917, and 1918, to be completely shown in this diagram, it has been found necessary to plot the the curves is less than in the case of the other products



TIN Cents per lb.	COPPER SPELTER Cents per lb.	SHEETS Cts. per lb. TIN PLATE Dollars per Box
51.60	42.60	.40
51.20	42.20	.30
50.80	41.80	.20
50.40	41.40	.10
50.00	**41.00**	**11.00**
49.60	40.60	.90
49.20	40.20	.80
48.80	39.80	.70
48.40	39.40	.60
48.00	**39.00**	**10.50**
47.60	38.60	.40
47.20	38.20	.30
46.80	37.80	.20
46.40	37.40	.10
46.00	**37.00**	**10.00**
45.60	36.60	.90
45.20	36.20	.80
44.80	35.80	.70
44.40	35.40	.60
44.00	**35.00**	**9.50**
43.60	34.60	.40
43.20	34.20	.30
42.80	33.80	.20
42.40	33.40	.10
42.00	**33.00**	**9.00**
41.60	32.60	.90
41.20	32.20	.80
40.80	31.80	.70
40.40	31.40	.60
40.00	**31.00**	**8.50**
39.60	30.60	.40
39.20	30.20	.30
38.80	29.80	.20
38.40	29.40	.10
38.00	**29.00**	**8.00**
37.60	28.60	.90
37.20	28.20	.80
36.80	27.80	.70
36.40	27.40	.60
36.00	**27.00**	**7.50**
35.60	26.60	.40
35.20	26.20	.30
34.80	25.80	.20
34.40	25.40	.10
34.00	**25.00**	**7.00**
33.60	24.60	.90
33.20	24.20	.80
32.80	23.80	.70
32.40	23.40	.60
32.00	**23.00**	**6.50**
31.60	22.60	.40
31.20	22.20	.30
30.80	21.80	.20
30.40	21.40	.10
30.00	**21.00**	**6.00**
29.60	20.60	.90
29.20	20.20	.80
28.80	19.80	.70
28.40	19.40	.60
28.00	**19.00**	**5.50**
27.60	18.60	.40
27.20	18.20	.30
26.80	17.80	.20
26.40	17.40	.10
26.00	**17.00**	**5.00**
25.60	16.60	.90
25.20	16.20	.80
24.80	15.80	.70
24.40	15.40	.60
24.00	**15.00**	**4.50**
23.60	14.60	.40
23.20	14.20	.30
22.80	13.80	.20
22.40	13.40	.10
22.00	**13.00**	**4.00**
21.60	12.60	.90
21.20	12.20	.80
20.80	11.80	.70
20.40	11.40	.60
20.00	**11.00**	**3.50**
19.60	10.60	.40
19.20	10.20	.30
18.80	9.80	.20
18.40	9.40	.10
18.00	**9.00**	**3.00**
17.60	8.60	.90
17.20	8.20	.80
16.80	7.80	.70
16.40	7.40	.60
16.00	**7.00**	**2.50**
15.60	6.60	.40
15.20	6.20	.30
14.80	5.80	.20
14.40	5.40	.10
14.00	**5.00**	**2.00**
13.60	4.60	.90
13.20	4.20	.80
12.80	3.80	.70
12.40	3.40	.60

nd No. 28 Black and Galvanized Sheets in

lot the prices of these metals on a special scale, and hence the sharpness in

Phases of Iron and Steel Metallurgy in 1918

Remedies for Ingot Defects—Strides in the Steel Casting Industry—The Manganese Problem—Alloy Steel Helmets

BY JOHN HOWE HALL*

THE principal developments in metallurgy in the past year arose chiefly from conditions due directly or indirectly to the war. New plants were built and many additions made to existing plants to turn out forgings, castings and completed parts for Army and Navy use and, naturally, these plants were built in a great hurry. In their operation many new devices and methods were thought out under the stress of the demand for maximum production and some surprising records were made in speed of operation.

Defects in Ingots and the Remedies

Naturally the call for ingots and blooms to supply these plants was enormous and every effort was made in the steel mills to raise production to a maximum. Before production was much more than started various defects appeared in the finished forgings, which gave rise to serious difficulty with a large number of rejections of finished and semi-finished material. These defects were particularly noticeable in certain alloy steel forgings for light crank shafts and for ordnance work, and the extent of the trouble was such that every effort was made to trace the source of the difficulty and to eliminate it.

It was found in a great number of cases at least that the trouble originated not in the forging or rolling mill, but in the ingot itself, and a great deal of valuable data has been secured as to the causes of the particular class of defects which appeared.

Naturally this information has not yet been published, but in the near future some very interesting data will be put before the metallurgical world along these lines. It is believed that the information that has been secured will be of great value not only in preventing defects in the particular classes of steel which have been investigated but in other classes of steel as well, and that considerable light will be shed on the origin of certain kinds of defects in steel rails.

The Manganese Problem

The scarcity of manganese ore suitable for the manufacture of 80 per cent ferromanganese and the necessity of bringing a great part of the ore from Brazil, led to the adoption during the war emergency of 70 per cent ferromanganese instead of the 80 per cent alloy as the standard. The necessity for this action arose in large measure from the fact that ships could not be spared to transport from Brazil and other places the necessary tonnages of high-grade ore necessary to produce the 80 per cent alloy.

Working along the same lines, every effort was made to utilize spiegeleisen instead of ferromanganese for the manufacture of higher carbon steels. Meetings of the steel makers of the country were held to encourage the use of spiegeleisen, at which the representatives of several plants who were successfully using the low grade alloy, gave their experiences, which had in the main been satisfactory. In most cases, of course, it has been necessary to install cupolas to melt the spiegeleisen, inasmuch as the large proportions of this alloy that had to be used could not be added cold. This was, of course, a return to the practice of the old Bessemer rail mills and data has been available for years as to the best methods of using these low manganese alloys.

There have also been manufactured several grades of silico-spiegel containing both silicon and manganese and during the war the use of this alloy has been considerably extended. There are several objections to its use which have prevented its being adopted as widely as the use of spiegeleisen.

The necessities of the country made it essential that several plants be built for the manufacture of ferromanganese in the electric furnace and had the war lasted a few months longer the total tonnage of electric ferromanganese would have been very considerable. Even as it was, a large amount was turned out and the difficulties incident to the manufacture of the alloy in the electric furnace were largely, if not entirely, overcome.

Strides in Autogenous Welding

During the war the use of autogenous welding methods made great strides and the accomplishments of the welders seemed in some instances little short of miraculous. Probably the best known instance of this was in the very rapid repairs made to the engines of the vessels taken over by the United States Government from the Central Powers. As an extra compliment to the men who accomplished this task the finding of memoranda in one or two instances in which the Teuton engineers had put themselves on record as saying that the repairs could not be made, has been especially gratifying.

Electric Steel

The number of electric furnaces in use in the United States has very greatly increased during the war, the most noteworthy instance perhaps being the triplexing plant at South Chicago, in which electric steel is made from metal which has not grown cold since it left the blast furnace. In this plant the metal is first blown in Bessemer converters, then treated in basic open-hearth furnaces for the removal of phosphorus and finally finished in the electric furnace with the resultant removal of sulphur and thorough deoxidation of the steel.

In the steel foundries especially the electric furnace has been used to a very great extent for the production of high-grade steel for Army and Navy use. As the foundries were being pressed for every pound of steel they could produce, several of them who were so situated that they could command a ready market for low phosphorus scrap, turned to the use of the acid electric furnace. Working on an acid bottom, it was not possible, of course, to turn out steel as low in phosphorus and sulphur as basic electric steel, but the phosphorus and sulphur could be made low enough to meet the specifications, provided sufficient low phosphorus scrap could be bought. The production secured was considerably greater than was possible in basic furnaces where two slags were used and this increased production made up, and in some instances more than made up, for the increased cost of the low phosphorus scrap over that of the scrap used in the basic furnaces. The steel turned out under skillful handling was found highly satisfactory for high-grade castings and, as

*Metallurgist Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

far as the writer is aware, very little difficulty was experienced in meeting the specifications.

High Grade Steel Castings

One reason for the great demand made upon the steel foundries was that in many cases it was found necessary to substitute castings for forgings in ordnance and other war work and, naturally under these circumstances, a very high grade of cast steel was called for. This was true not only of the soundness of the castings but of the physical properties demanded. Under these circumstances, many foundries found themselves face to face with the necessity of taking much greater pains with their molding and pouring practice in order to meet the demands for well-nigh perfect castings. Shops which had previously made but few tests on their steel found that their steel-making and heat-treating practice would have to be considerably improved if the castings produced were to be accepted.

In the matter of the steel-making practice probably the best way to summarize the conditions is to say that many shops found it necessary to decrease the output of their furnaces in a given time if they were to make steel of suitably high grade to meet the physical specifications. It was also necessary to pay a great deal more attention to annealing the castings and to do the work more carefully, and in a certain number of instances heat treatment properly so-called was substituted for plain annealing with decidedly beneficial effects.

It should be said in fairness that the improvement was not all on one side, as the steel makers were able to convince the Government engineers that in certain instances their specifications were too exacting, and it is safe to say that the modifications made in the specifications really led, in a great many cases, to securing better all-around steel than could have been obtained under the specifications as originally written.

The fact, however, that the war demand led to considerable improvements in the general properties of steel castings is shown by the fact that there is now a movement on foot to add to certain standard specifications, a new class of cast steel, the physical properties of which are to be based on what it has been found possible to do during the last year.

Cast Steel Chain

A large American company has for several years been manufacturing knuckles for car couplers of a high grade cast steel of special composition made in the electric furnace. These castings are heat treated by quenching and reheating and the record that they have made in several years of service has been remarkable.

It was found that the capacity of the country for manufacturing forged anchor chain for ships was insufficient to meet the demands for chain for the great number of ships being built, and a little over a year ago experiments were started looking to the manufacture of a cast steel chain. After a number of experiments had been made in which various foundrymen and engineers co-operated, the problem was successfully worked out and the chain has been turned out in quantity. The molding methods were exceedingly ingenious and efficient, and the chain was found to meet all the tests demanded of it in a satisfactory manner. The steel used was the same as that of which the knuckles had been so successfully manufactured and the heat treatment was also substantially the same.

Heat-Treated Steel Castings

It seems virtually certain that the conditions just outlined have given a great impetus to the use of heat treatment for certain classes of steel castings and the writer believes that in the next few years we shall see great strides made in this direction.

The great demand for steel to be made into shells overtaxed the available capacity of the country for bar steel, and the result was that an enormous tonnage of cast steel slugs was made and very successfully pressed into shells in the forging plants. The problem, of course, was almost entirely one of production and the metallurgical features were few, for the chief requisites were that the slugs should be solid, free from cracks and pipes. By using a good-sized sink head and properly designed molds, these requirements were easily met.

Some time during the year attention was drawn to the fact that an enormous tonnage of semi-steel shells could be used successfully and at least one large company which had been manufacturing these shells abroad prepared itself for the manufacture of these shells in quantity, and other companies were being equipped with the same object in view at the time the armistice was signed. The methods used in the manufacture of these shells had been completely worked out and had hostilities lasted but a little longer a very large tonnage of these shells would have been manufactured in this country.

The difficulties of the manufacturers of coke led to complications in the operation of the blast furnaces of the country and the demand for low phosphorus pig was so increased that a considerable scarcity was threatened and at one time seemed imminent. It is a fact, however, that the 1918 output of this grade of pig iron was nearly 700,000 tons, or nearly 50 per cent larger than that of 1917.

Oil-Burning Cupolas

A process which had been worked out previous to 1918 for using oil to replace part of the coke in the cupola melting of charges for the converters in small steel foundries has made considerable progress during the year. By the use of this process it was found possible to turn out steel considerably lower in sulphur than was possible when melting with coke alone, and incidentally a considerable saving in coke could be attained. By this process it was possible in some instances to meet specifications for sulphur with converter steel which could not be met by the foundries when melting with coke alone.

Experiments have been made in the recovery of potash from the flue dust from blast furnaces and cement kilns, and it has been found that a considerable amount can be secured from these sources.

Alloy Steel Helmets

An interesting development in the demand for war material was the manufacture of helmets, which were made from alloy steels produced in quantity. The ingots were rolled into thin sheets, the sheets cut to size and the helmets pressed from these blanks in special dies. To go into some of the plants making helmets and see specimens of their peace-time output in the shape of kitchen utensils brought up whimsical comparisons with the equipment of Don Quixote—but the rate at which the helmets were being produced and the systematic handling methods used allayed any misgivings that first impressions might have caused.

Republic Iron & Steel Co. is preparing to blow out No. 2 blast furnace at Haselton, Ohio, for relining and to enlarge its capacity from 400 to 500 tons daily. With this stack repaired the Republic company will have all of its Northern furnaces in fine operating condition and with an annual metal producing capacity of about 1,000,000 tons. Republic's three furnaces in the south can make about 250,000 tons of pig iron yearly.

The Meadville Malleable Iron Co., Meadville, Pa., manufacturer of castings, etc., has increased its capital to $167,000.

Novel Plant of American Tool Company

Latest Ideas in Heating and Ventilating, Lighting Features, Transporting Facilities, Sanitation, Handling Turnings—Unusual Drive for Planers—Machine Foundations

BY C. L. SMITH

THE new plant of the American Tool Works Co., Cincinnati, is the result of approximately ten years of thorough study and preparation. The new building, five stories high, is at Pearl Street and Eggleston Avenue, opposite the Pennsylvania Railroad station. This location is ideal from the viewpoint of accessibility for the firm's traveling customers. It is within 10 minutes' walk of the center of the city, has shipping facilities surpassing those obtainable anywhere else in Cincinnati, and has also a big advantage from the point of labor supply. For years this plant has been visualized by the management, and its many unusual engineering features were developed by R. M. Taylor, works engineer.

The building is of reinforced concrete construction, absolutely fireproof and with a floor area of 245,000 sq. ft. A total of 859 Simplex type concrete piles, 20 in. in diameter, support the edifice, each pile designed to carry 50 tons. In some instances they were driven to a depth of 55 ft. to secure the proper setting. Approximately 750 tons of steel, 1800 bbl. of cement, 12,000 cu. yd. of stone and 6000 cu. yd. of sand were used in constructing the plant.

In the rear of the building proper is a yard 80 x 225 ft. served by a 10-ton 80-ft. span Pawling & Harnischfeger crane. This yard is for storing the larger castings, and for the movement of incoming and outgoing shipments.

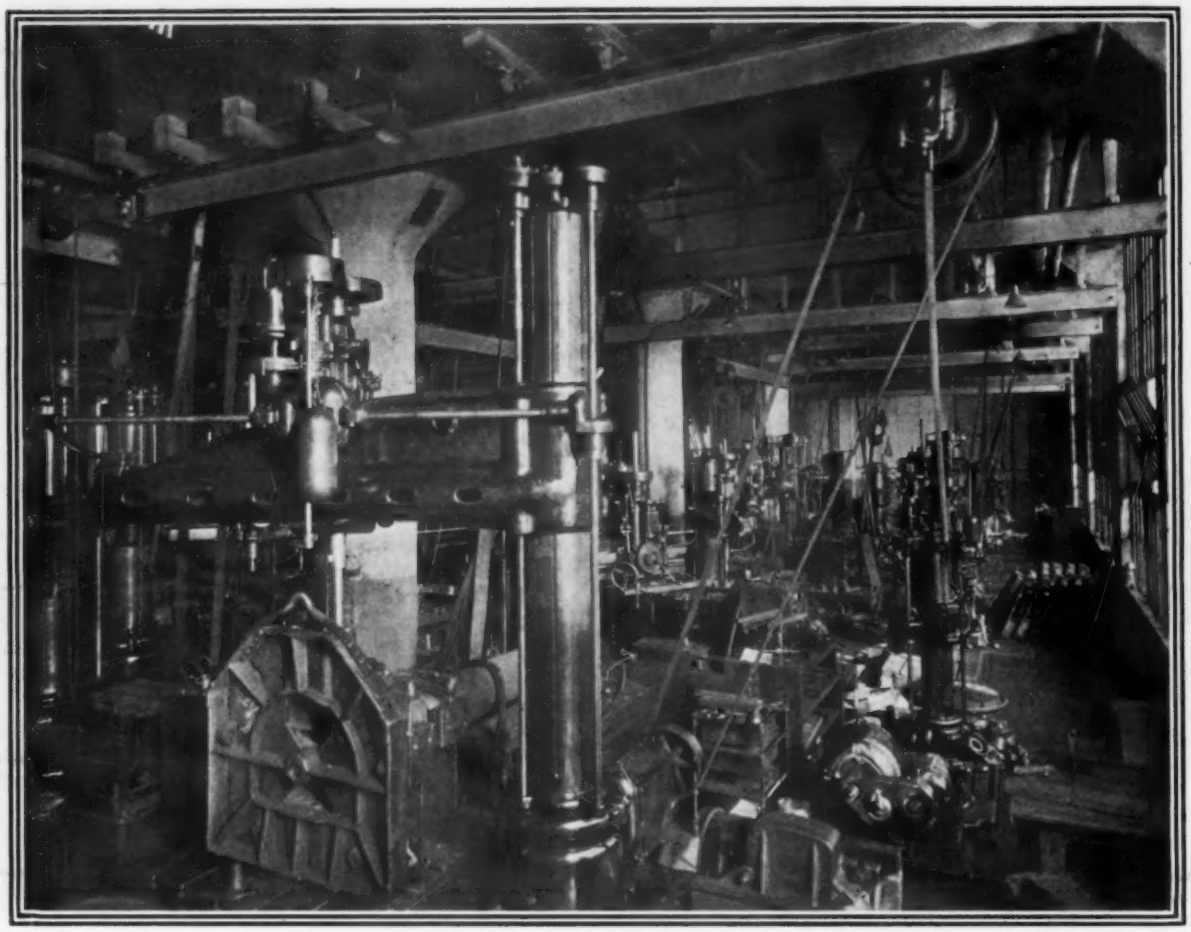
With the exception of garage space, casting, cleaning and cutting-off department, the entire first floor is used for material storage, an elaborate equipment of bins, racks and shelves being installed. The entire second, third, fourth and fifth floors, with the exception of that part of the third floor occupied by the office and engineering department, are devoted to manufacturing in its various phases. A court, 50 x 140 ft., is on the second floor, and is completely roofed over by a skylight at the base of the fourth floor. This court provides the working area for a 15-ton Pawling & Harnischfeger traveling crane serving the large machines in the court.

A side track, of the proper elevation to bring the door of a box car to the level of the platform floor, serves the shipping platform outside the erecting floor and the packing department. Another track along the side of the building is for unloading incoming cars into the storage department.

The heating equipment includes two multivane type fans on the roof, each with a capacity of 60,000 cu. ft. of air per min., and driven by 35-hp. motors. These fans draw a combination of outside air and air from the interior of the building received through return ducts around the columns. In its course to the fans this air passes through 10,752 sq. ft. of 60-in. Vento sections of steam-heated radiators after which it passes through a humidifier. The air, now conditioned, is forced through distributing ducts to hollow or ventilating columns throughout the building. The openings in the columns are in the head near the ceiling, and face the exposed portions of the rooms; thus a circulation of air is maintained.

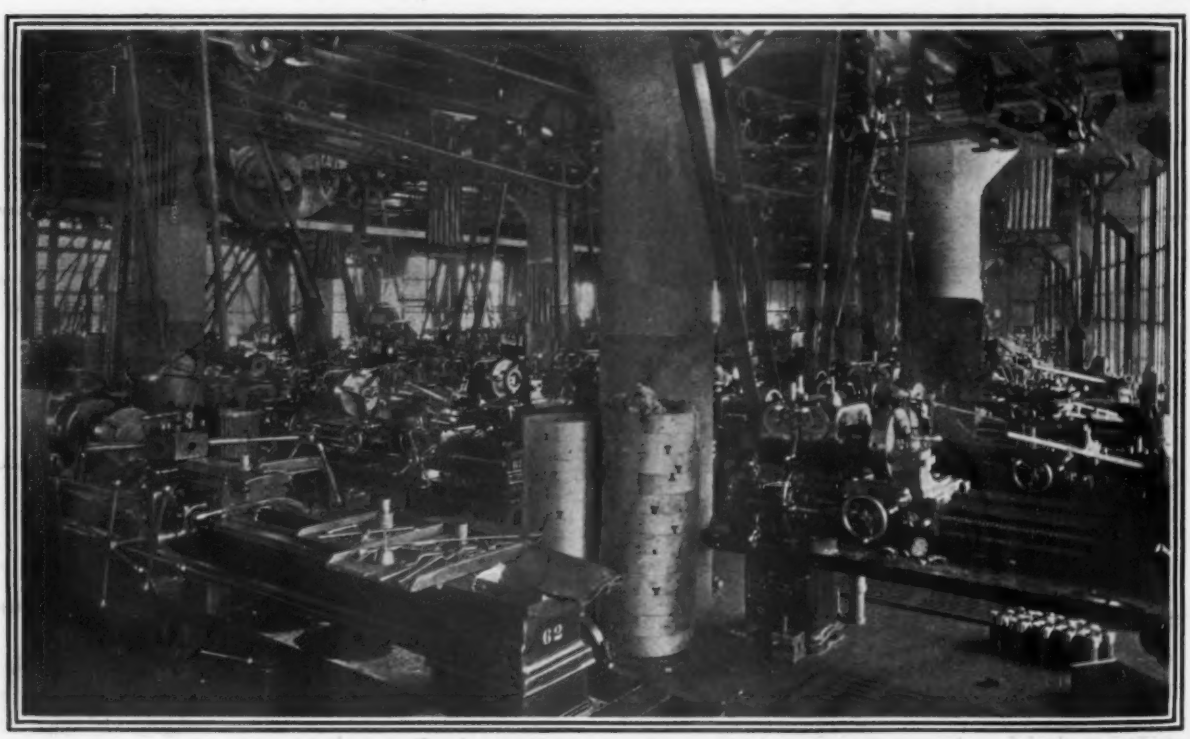
Particular attention was paid to securing a sufficient supply of light, practically the entire outside walls being of glass in pressed steel sash. In fact,

Main Bay on Second Floor Viewed From General Superintendent's Office on the Third Floor. Planer department shown at the right. Size of main bay is 50 x 140 ft. with 29 ft. head room between floor and roof trusses



Radial Drilling Machines Are Driven Direct From the Line Shaft, Eliminating All Countershafts

80 per cent of the wall area is glazed, 50,000 sq. ft. of glass being used. The upper half of the window is glazed with factory ribbed glass, the ribs running crosswise on the inside. Directly on the line of vision is an area of clear glass, and below this factory ribbed glass again, with its ribs extending lengthwise on the outside. From experiment it was found that glass with the ribs running crosswise would diffuse the sun's rays considerably, and when installed in the upper part of a window would refract the light rays, diverting them largely against the ceiling, from which point they are reflected throughout the room. To increase the intensity of this reflection the walls and ceiling have been painted white. It is interesting from a scientific standpoint that this particular method produces the effect, even on a cloudy day, of the sun's shining directly upon the pane. On the lower half of the



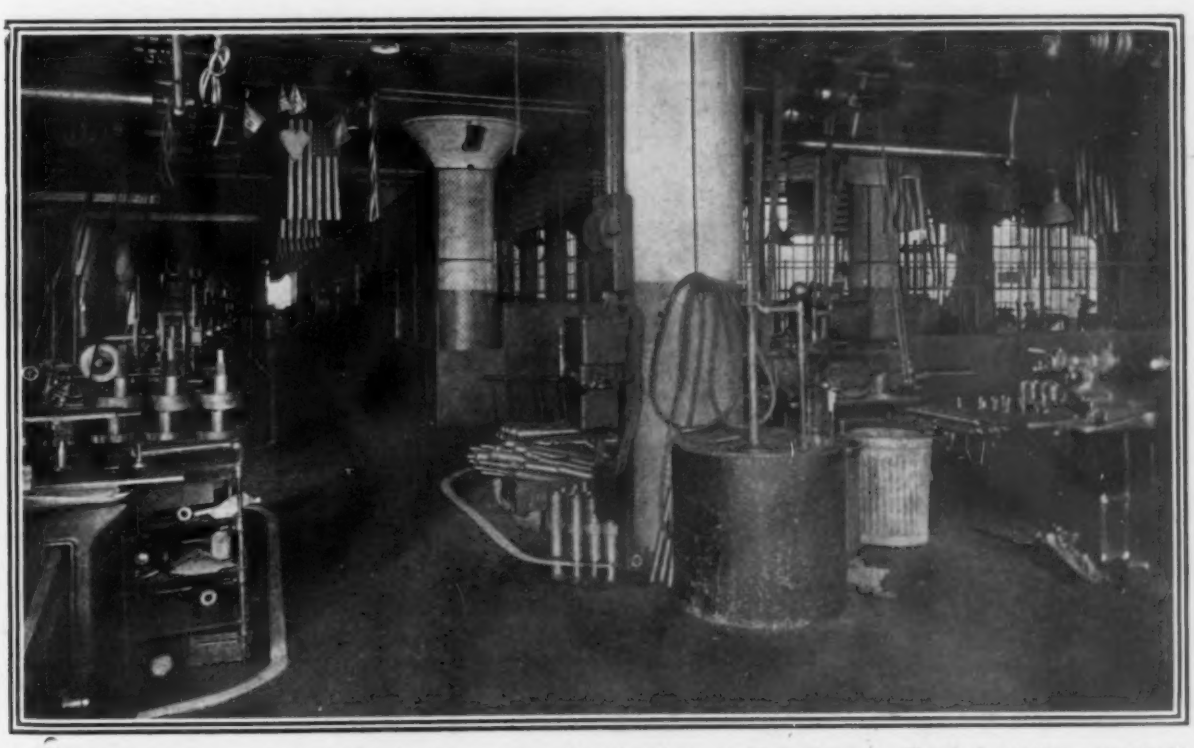
General View of Lathe Department on East Side of Fourth Floor

Vise and Assembling Departments on Fifth Floor

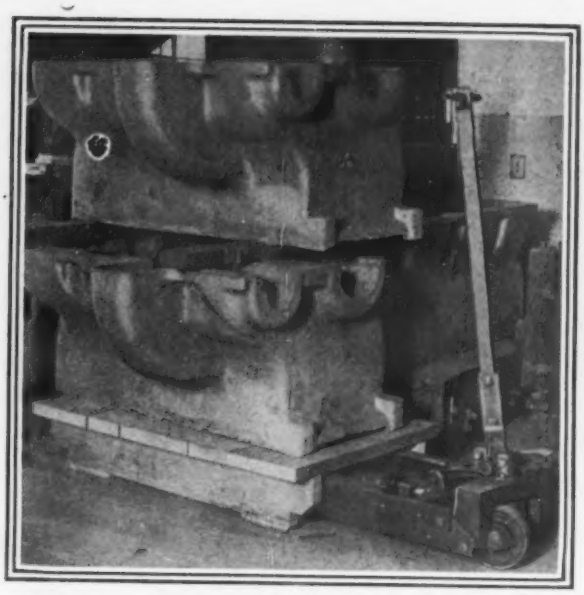
window below the clear belt line, the ribbed glass panes are installed with the ribs running lengthwise on the outside for the purpose of breaking up the light rays, and refracting them into a different direction, so as to avoid a glare upon the eyes when looking downward.

Approximately 2450 100-watt type C Mazda lamps are employed for artificial lighting, averaging one to every 100 sq. ft. of floor space and producing a light intensity of about 5.6 foot-candles per sq. ft. Single-phase alternating current at 220-110 volts is used with a three to two-wire system.

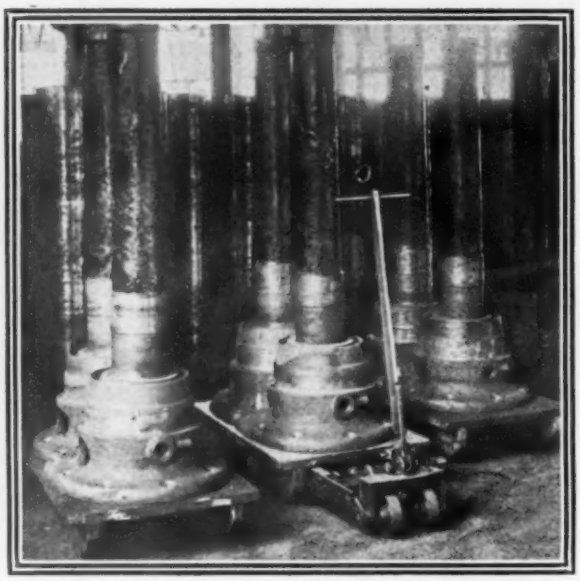
Each manufacturing floor is arranged as a separate unit as far as possible, but to save time in transporting work from one floor to another three Warner electric elevators are provided, one being 9 x 20 ft., of the worm-gear type and of 8-ton



The Tool Storage Room Is Centrally Located Between the Manufacturing Departments. The tool grinding room is at one end of the enclosure and the tool manufacturing department at the other end



Lift Trucks Are Used for Handling Both Heavy and Light Castings



The Truck Is Also Used for Handling Large and Small Finished Parts

capacity for handling the heaviest work, and the other two rated at 3 tons for lighter work, and arranged to travel at 50 or 200 ft.

All elevators have special Peele safety doors that must be closed by hand and locked before the car can be operated. Likewise it is impossible to open these doors until the car stops at the floor.

In addition to the three elevators, the 15-ton court crane and the 10-ton yard crane, there are 25 smaller cranes, 9 of 5 tons capacity and 16 of 2 tons capacity. These cranes are hand traveling, but practically all of them are equipped with variable-speed Shepherd electric hoists and foundry type controllers.

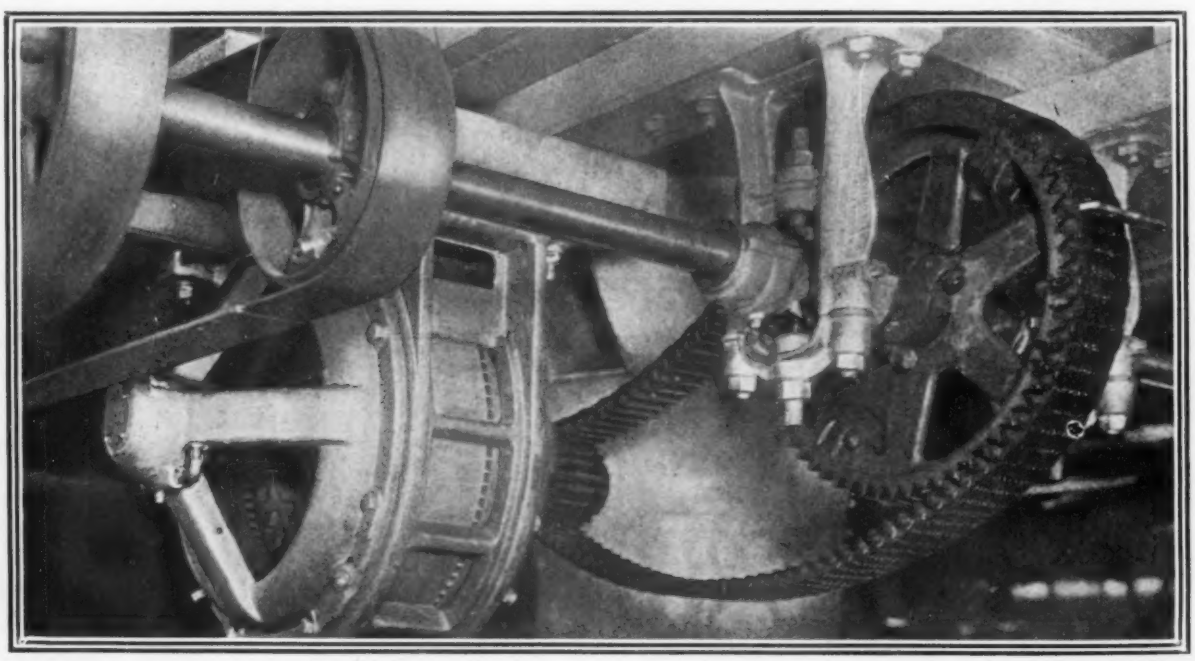
An important part of the transportation service is performed by lift trucks. The large number of platforms are carried by a total of 48 Stuebing master lift trucks. This system of handling small parts not only saves considerable time, principally in the elimination of rehandling pieces of finished and unfinished work, but it enables the foremen in the various departments to keep the aisles clear.

A washroom and a locker room are on each floor. Each locker room has a shower bath and the highest grade steel sanitary lockers, while the washrooms have one-piece enameled sinks with combination faucets for hot and cold water. Hot water is supplied by three 500 gal. per hour round storage heaters in the boiler room, stored in a 3000-gal. tank, and distributed through a circulating system.

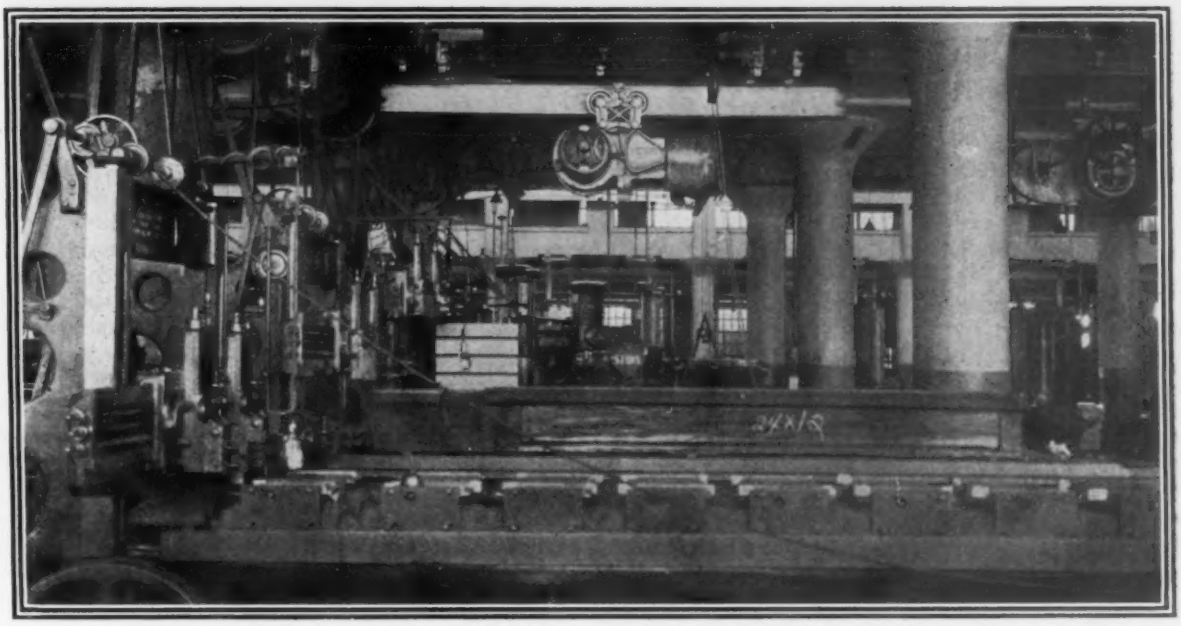
The shop toilet rooms are at three different points on each floor, making them easily accessible. A ventilating shaft is in each room, and the system is further improved by raising the toilet doors to allow the air, under pressure from the fans, to circulate through the rooms and out through the ventilators.

Bubbling drinking fountains are on all floors so that one can be reached without walking more than 50 feet from any part of the shop. The water is supplied by an Audiffren-Singrun refrigerating machine on the roof. This machine cools the water to 50 deg. Fahr., and stores it in a 1000-gal. tank. All fountains are piped in series, compelling the water to flow past every one on its circuit.

The health of the employees is further protected by sterilizing the cutting oil used on the automatics. The circulating system employed for distributing this oil provides for an effective filtration and chemical sterilization.



Silent Chain Drive Is Employed Throughout the Shop on Every Line Shaft, and Wherever Practicable on Direct Motor-Driven Machine Tools. The drive and line shaft with the guard removed are shown



Shepard Crane Serving Group of Planing Machines. The crane runway is suspended by battens hung on inserts from the ceiling. A total of 5500 inserts, spaced on 2 ft. centers and fitting the heads of ¾-in. bolts, are provided

A garage space on the first floor, 60 x 100 ft., accommodates machines of officers and employees, as well as the company's trucks.

Compressed air at 90 lb. per sq. in. has been provided for all departments, a 600 ft. per min. Ingersoll-Rand air compressor being installed for this purpose.

The plant is equipped so that borings and turnings are only handled once. This is effected by having vertical metal chutes with openings on each floor from the fifth floor to the basement, where the material is discharged into square metal boxes, of which a number sufficient for a carload are provided for storage purposes. These boxes have a trunnion at each end fixed just above the center of gravity. When loading this class of scrap in cars or wagons, it can be done quickly by the yard crane which has an auxiliary hoist to dump the box while suspended.

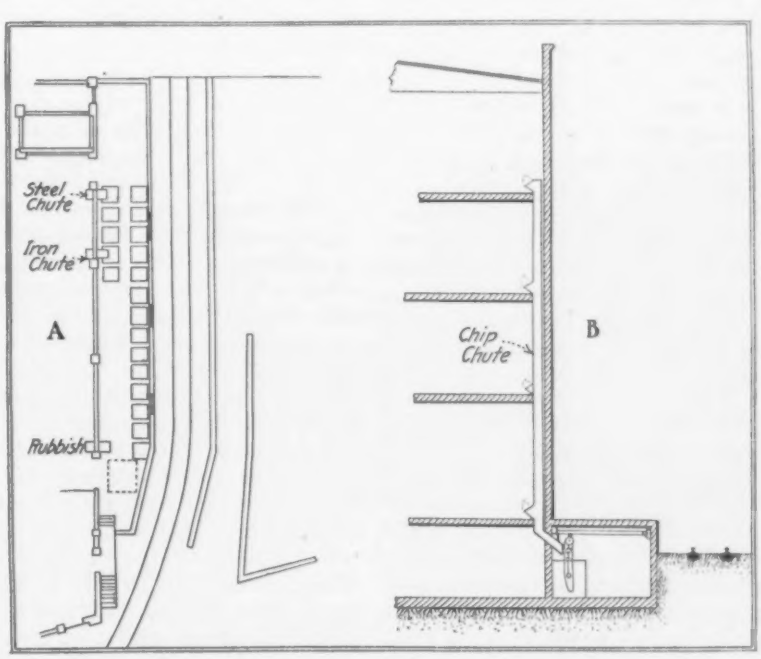
The radial drilling machines are not provided with countershafts, each machine being driven direct from the line shaft. This arrangement was found to be very satisfactory in reducing friction, saving about 25 per cent of power, as well as considerable extra belt expense. By placing the radial drilling machines back to back with no countershafts and pulleys to intervene, the belts being brought down into this pocket, a clear overhead space is left for a traveling crane between each row of drilling machines.

The heavy planing machines are on the east side of the second floor in groups. The drive for these planers is out of the ordinary. The cutting stroke is driven by a variable speed direct-current motor at a speed ranging from 15 to 70 ft. per min. The return is taken off a constant-speed shaft, returning the table at a speed of about 90 ft. per min. The regular planer mechanism takes care of the shift from one motor to the other.

The planing machines are mounted on the second floor without any support except the regular building columns beneath them, placed 30 ft. on centers. These planers are not fastened to the floor in any manner; they are merely firmly grouted. This grouting takes the form of a sill 8 in. high. These sills contain leveling jacks, and after the planers are properly leveled, melted sulphur pockets are poured at intervals to take care of any shrinkage in the grouting. These sills were not cast with the floor and are absolutely separate from it.

The whole arrangement is based upon the theory that if an intimate contact between the planer setting and the floor is provided with sufficient surface it will resist any tendency of the machine to move. Although having been in use some time there has developed no tendency on the part of the machines to "walk," and no objectionable vibration is transferred from one machine to the other, although there are 40 planers in this group.

The machine-testing departments are located on the second and fifth floors, and the machines are driven from line shafts that have friction cone pulleys, arranged in such a manner that they do not in any way interfere with the crane service.



A Shows the Space Under the Loading Platform, and *B* a Cross Section Through Building

Reconstruction Situation in Europe

Slow Progress Probable—Iron and Steel Plant Expansion in England and France—Fears of Unemployment—After War Co-operation Sought

(Editorial Correspondence)

LONDON, ENGLAND, Dec. 13.—Reconstruction in France will proceed slowly. The French Government appears to have no plans, and even if it had any, it has no money. Such in unvarnished words is the outstanding fact gleaned in a few weeks' sojourn in England, Scotland and France, at luncheons and dinners and in personal chats with army and navy officers, captains of industry and politicians of Great Britain and France.

The writer had the exceptional privilege to be a member of the party of trade journalists who were guests of the British Government on the invitation of the Ministry of Information of Great Britain. This party had been invited to learn at first hand something of the prodigious war effort of England, for such it was, but chiefly to secure opinion-forming facts, which, owing to the barriers of censorship and prohibited traveling, were not so freely interchanged through the period of the war between the two shores of the Atlantic as seemed desirable. A few days after landing came the signing of the armistice; and reconstruction, readjustment of industry and demobilization became the problems of the hour. Forthwith the formal meetings between the British and the Americans and between the French and the Americans took on some consideration of the best means of procuring the same close co-operation in the after-war relations as that which marked the prosecution of the war. All this, to quote from the foreword of the prospectus of the British Educational Mission to the United States was from the British standpoint, "to the end, greatly desired on both sides, of making increasingly firm the bonds of sympathy and understanding that now unite the English speaking world."

The conclusion to be drawn from the situation in France is that that part of the business community which has been emphasizing continued trade activity on account of the needs of reconstruction must revise estimates. Anyone who has seen the vast areas of desolation and ruin must at least be convinced that many former towns will be rebuilt, if ever, only when the conditions of revived agriculture or manufacturing demand them. They will hardly come first. When it is realized that not one, but many, former villages have nothing, not even minarets of jagged brickwork, to mark their location, but only British signs, such as, "This is Souchez" or "This is Hooge," it is believable that mortals will not soon disturb the vegetation which is already efficiently luxuriant in the moist climate of northern France to hide the low mounds of crushed masonry.

Recovery of Coal Workings of First Importance

Of first importance in reconstruction is the repair of the coal-mining industry, such as that centered around Lens, a city now of endless unroofed ruins, and like all heavily shelled places, with nothing combustible remaining. The unwatering of the flooded mines and repairs and replacements of machinery and apparatus will take two and in some cases five years to obtain full production. For a country which before the war, consumed 65,000,000 tons of coal annually and produced from all sources 41,000,000 tons, the rehabilitation of this natural resource is manifestly vital. What may be done to this swath, miles wide, of churned up clay and chalk, as it is in some regions, fought over for four years, with the once fertile soil lying buried along with countless tons of exploded and unexploded shells is for the soil expert to determine, but after him must come the unravelling of claims to land ownership before habitations can be expected to spring up in the former large groups.

Preparations to Utilize the Lorraine Ore

It remains that the needs for rebuilding in the devastated areas of France and Belgium is put at 50,000,000 tons of iron and steel and undoubtedly all of this will be absorbed, but not, of course, in the early future, but over a period of some years. It must be admitted that France is encouraged by the expected return to her of the great Lorraine iron ore basin, and active steel plant enlargements, repairs of the Nancy region works and new rolling mill capacity are now being actively considered. Singularly, in the Briey region of Lorraine held by the Germans, blast furnaces were left substantially intact by the Germans on their evacuation, but open-hearth furnaces were wrecked. The fact that both Great Britain and the United States have nearly doubled their steel-making capacity (with the United States, incidentally, thus retaining the ratio of four times the output of England) does not concern France. She is exhilarated with the easy possibility of doubling her ore production from the Longwy-Briey-Nancy fields of Alsace-Lorraine. Before the war, Germany, exclusive of Luxemburg, obtained 74 per cent of her ore from the so-called annexed portion of Lorraine, upward of 21,000,000 tons annually. Having an iron content of about 33 per cent, this represents roughly 7,000,000 tons of pig iron.

Relative Status of France, Germany and Great Britain

While not strictly accurate. it is worth while in passing to note that counting on Germany's losing between 6,000,000 and 7,000,000 tons of steel-making plants through relinquishing Lorraine, and crediting this amount to France, the interesting situation is reached in which Great Britain, France and Germany will each have between 11,000,000 and 12,000,000 tons steel-making capacity.

The production figures for the three countries bears this out. The United Kingdom in 1917 produced 9,804,079 tons of steel. Germany's output for 1916, with estimates for the last two months made by the Iron, Steel and Allied Trades Federation, London, was 16,035,000 tons. The loss of 6,000,000 tons brings Germany's output thus to 10,000,000 tons, as it is doubtful if any noteworthy expansion was made in 1917, and this 6,000,000 tons added to the production of France in 1913, or 4,686,866 tons, brings the French figure to something in excess of 10,000,000 tons, which, of course, does not take into account some of the destruction by war. Germany's

steel capacity, as differentiated from production, and based on previous performance, exclusive of Lorraine, is in excess of 17,000,000 tons, but, of course, the loss of ore and therefore of pig iron will mean many idle steel furnaces, unless pig iron is imported. Taking Germany's steel output as roughly 18,000,000 tons before the war, she exported one-third and thus consumed annually about 12,000,000 tons.

On the basis of her own ore, including that of Luxemburg, she should be able to remain self-sufficient but would have difficulty in maintaining an export trade. Many think that France will be on a 12,000,000-ton footing, at least in point of capacity, and England expects to finish the year with a capacity in excess of 11,000,000 tons and by the end of 1919 with one of 12,000,000 tons.

The Unsatisfied World Demand

Outside of the reconstruction demand, the chief hope of active business lies in the unsatisfied world demand held in check by the concentration on war. This is estimated to amount to 100,000,000 tons for the four past years, or a little more than all the would could produce in one year under ideal conditions for the whole period. Much of this demand is admittedly pressing, but the shelves of the world's distributers are not as empty, in the opinion of a number of observers, as many believe, and those with the less optimistic views hold that while the unsatisfied purchases are now dammed up, buyers who have been kept waiting for many months may well regard it advantageous to wait a few more with conditions pointing to a market of receding values.

The outcome of such a stand is, of course, a relatively dull period for the next few months. This opinion is, however, directly contrary to the views of some of the leading iron and steel masters of Great Britain, who held on interviews in late November and early December that Government control of prices must remain as a stabilizing force and a check against rapidly mounting prices which they said would quickly result if Government restraint were removed.

Removal of Subsidies Serious for Britain

If this British view be incorrect and the operation of natural laws brings about lower prices in international commerce than now obtain, the iron and steel trade of the United States has a large opportunity to undersell the British manufacturers. For, as has been noted in these columns, export prices for the United Kingdom were materially raised about Dec. 1. The Government desires to divorce itself from the subsidies which its fixed-price policy have developed and as rapidly as the industry can stand it. It absorbed increases in ocean freight on raw materials and also the increases granted to labor to an amount exceeding $200,000,000, and it is now the plan to put iron and steel at the true economic level. As yet domestic prices remain at their artificially low basis but it is to the credit of the British Government from the broad standpoint that it does not want it said or believed that its export prices give its industry undue advantage in world dealings. Meanwhile some of her producers are supine in their belief that the outside demand is sufficiently great that the price situation will take care of itself.

Expansion in England

The optimism which pervades the English iron and steel industry is indicated in the efforts being made to rush to completion the numerous expansions to capacity which were under way in the war period. The industry never had the number of workmen which it could use and new construction was delayed by the scarcity of raw materials and the inability to get labor to build or to operate. The American spirit of amalgamation is in the air, with several big unions as has doubtless been noted in these columns in the recent past, and some of the new plant extensions would at first glance make one believe he were looking upon an American institution.

One of the largest additions to steel capacity includes a noteworthy open-hearth plant near Rotherham, Sheffield, for Steel, Peech & Tozer. Here in an imposing structure one-fourth of a mile long are to be twelve furnaces of 60 tons capacity each, equipped with Diblee valves and Wellman-Seaver-Head charging cranes. The up-to-date character of the furnace plant, which is basic, would lead to the impression of a high production addition to the large works of this well-known institution, but as yet British steel mill workers, earning big wages, have not exerted themselves even with this remarkable plant provided for them, and 10 heats per furnace per week is all that can be counted on, at least at the present time.

A blooming mill, a continuous billet and a continuous rod mill of the Morgan design being built in England are being erected at the end of the open-hearth plant. Another case may be mentioned of a rolling mill which is now working up designs for an extension, which owing to the crowded character of British builders will have to be made in the United States. Steel works engineers are also engaged in prospective developments in France and Belgium.

Effort to Avoid Unemployment

A smoldering volcano is about how the wide labor unrest of the United Kingdom and also France is regarded. From the Governments down there is everywhere fear of Bolshevism, though probably greatly exaggerated. So great is the effect of unemployment dreaded that demobilization of the armies is going on slowly. It is a commentary on the situation that quantities of shells are machined only to be scrapped. Such useless work, in fact, may go on for some months. The cost of this waste of material, time and energy is evidently regarded as immeasurably less than the cost of an outbreak of anarchy. Some British manufacturers would like a release from Government control and thus push conversion to peace time pursuits, but those in power are believed to have a broad viewpoint and will loosen the reins when possible. Many general war articles are being completed to be stored as spare parts for existing constructions, such as parts of fighting tanks, and of course Navy shells are being made in quantities but these are likely to go, as before, into the naval stores.

A Government program for building 500,000 homes is expected to help in the transition to normal occupations, and shortly after the signing of the armistice shipyards given up practically altogether to war ship construction began to focus on the merchant marine needs. Large railroad purchases of equipment were made early in December, as reported by cable at the time in these columns.

War Scarcity of Labor

Iron and steel plant workers were generally exempted when conscripton came into force, but their ranks had to be augmented from time to time for the rapid expansion in plant capacity. Labor has never been at any time sufficient, as already stated. The industry counts on continuing to pay more or less indefinitely the present high wages, but it will

be facing a serious situation if labor leaders either cannot see or cannot convince their unions that a further advance talked of savors of strangulation. At this writing it is stated that labor will be appealed to in immediate future to help the industry to slide gradually but safely from the artificial basis to the sounder one of self-sufficiency. Parenthetically it may be stated that representatives of the trade are not in precise agreement as to relative wage increases but where living costs have increased 100 per cent in the war period, wages have gone up 110 to 120 per cent. At least all are emphatic that the wage percentage increase exceeds the living cost ratio of increase. Smelters and head rollers are now getting £400, £500 and even £1000 per year. Cases are noted of over £27 per week in the open hearth department.

The general fear of a Bolshevik movement does not of course center in the iron and steel works but is the undercurrent of concern troubling the British industrial world. The country at this writing is watching the coal fields and such shipbuilding centers as the Clyde and metal working districts like Manchester. Demobilization was planned to take care of the key industries, with the coal mines first and the shipyards second. England is closely rationed as regards coal and though the necessity of dark cities through fear of air raids is past, street and shop window illumination has substantially not yet arrived. About 100,000 coal miners were first to be released from the army but there is no guarantee that they will apply themselves to anywhere near the full number and certainly no one expects them to do so until they have spent some time in the way of a holiday. If one experience is any criterion, a case may be mentioned of three miners going to work out of 55 returned. The coal situation will remain serious for no one knows how long.

Summed up in a few words, the wage earner, according to present signs, is going to retain his present high income but his condition of living may not be brought to any higher level than has been the case, in spite of Government reformers to the contrary. The Government is committed to the enormous housing plan mentioned, and, of course, labor is well informed. Labor leaders appreciate also the fear of the authorities over unemployment and naturally the stopping of munition making has already occasioned more or less of it, particularly of women, numbers of whom recently demanded higher unemployment awards from the Government than given.

At least a few manufacturers are considering sending small groups of workers, probably with a foreman, to the United States, thus to observe shop conditions in America. There is quite a desire for co-operation after the war as in it and as costs are high in both countries it is seen that labor must be more productive. The more progressive employers are likewise, in recognition of the demand of the times, willing to accept a continuation of excess profit taxes, in this way meeting the cry for a limit of the return on capital.

The 8-Hour Day Now Obtains

The eight-hour day which is to come on Jan. 1 will probably mean 47 hours per week in some cases, and as the workers expect the same wage return, the trade is thus facing another wage advance. The early morning hours in the metal-working trades, from 6 to 9 a. m., when a knock-off was taken for breakfast, are now quite widely admitted as being of relatively low productivity, and many are looking for a marked improvement in the industrial atmosphere for this reason alone. One large employer is even advocating vacations for wage earners just as they are given to the office force. Sir Robert Hadfield's address in this regard was printed in THE IRON AGE of Dec. 26.

England's Exports Negligible

Steel exports for commercial purposes from England have been negligible in the latter half of the war. Priorities for export could be obtained only for direct and indirect war needs. What will be the attitude with regard to the importation of German products is not clear. Certain it is that some of the conversion plants comprehend the development of stamping and pressing plants and the manufacture of the cheaper line of articles such as Germany supplied to England as well as to Canada and the United States. Probably 95 per cent of the enameled ware consumed by Great Britain came from Germany.

Finally, it should be said that in both Great Britain and France the hope is expressed that co-operation after the war continue with the United States. The British own to no fear of the United States in world trade—they believe there is room for all—but they urge that there is no need of ruinous competition, and though vague as to the precise step which should be taken, regard an international commercial understanding as essential to the maintenance of world peace. France frankly wishes for an export trade to the United States and plans are under consideration for an occasional exhibition, say in New York, of the wares which she would like to sell to the Americans. There are signs that international advertising, considering the subject in its broadest terms, is coming on a large scale, for the creditor nation cannot also remain exclusively a seller of its own productions. W. W. M.

Large Increase in Automobile Output Expected

DETROIT, Dec. 30.—Automobile manufacturers report that they expect from 40 to 50 per cent more automobiles will be made in this district in 1919 than in any previous year and that by 1920 the increase will be 100 per cent. As a majority of the manufacturing facilities of the entire state are largely engaged in producing automobiles or parts in normal times, the prediction of manufacturers is expected to mean a period of great prosperity. The Ford Motor Co. and the Studebaker Corporation have already announced the greatest production program in their history, and other plants are arranging to enlarge their facilities. As a result, machine tool dealers, who report just a fair market at the present time, are looking forward to a period of extensive selling.

Construction work in the state is increasing in volume each week. Concerns holding war contracts are rapidly filling them and getting back to a peace basis. The readjustment appears to be taking place with little difficulty. Labor is well employed and wages remain as they have been for the past six months, with practically no strikes or boycotts.

Hints of price wars among automobile concerns are ridiculed by manufacturers, who state practically unanimously that both labor and material will remain high for a considerable time, and that the only possible reduction in automobile prices will come through quantity production. Profits have been reduced as far as possible, they declare, while materials are from 8 to 15 per cent higher than they were a year ago. Enlargement of production may mean a slight decrease in the price of some cars but no general reduction is expected before midsummer.

The Birmingham Steel Corporation, Birmingham, Ala., plans the construction of additional units to the fabricating plant when the present unit is completed. The company will make steel for the building of vessels. G. S. Bergendahl is chief engineer.

Exceptional Record of Mark Plate Mill

Universal Mill for Plates and Skelp 8 to 42 In., but Adaptable for Sheared Plates 80 In. Wide

BY CHARLES LUNDBERG

BUILT in record time under the stimulus of a need created by the war, the Mark plant of the Steel & Tube Co. of America, East Chicago, has given a good account of itself. In October the 30-in. universal plate mill, operating largely on orders from the Railroad Administration, rolled 17,387 tons of plates, against an estimated output of 12,000 tons, a record more notable because of the total tonnage rolled some 80 per cent consisted of plates 5/16 in. or less. That month the four open-hearth furnaces, each rated at 75 tons capacity, produced 18,429 tons of steel melted from cold stock, and the blooming mill rolled 27,658 tons. Of the steel placed in the soaking pits 16,594 tons were cold and 11,064 were hot. This was done in four soaking pits.

At the time of the merger of the Mark Mfg. Co., the Iroquois Iron Co. and other interests, THE IRON AGE of July 11, 1918, contained an article briefly describing the expedition with which the Mark plant was built, and enumerating the principal equipment. The universal mill was placed in operation April 1, this being 14 days less than a year from the time when the first foundation piles were driven.

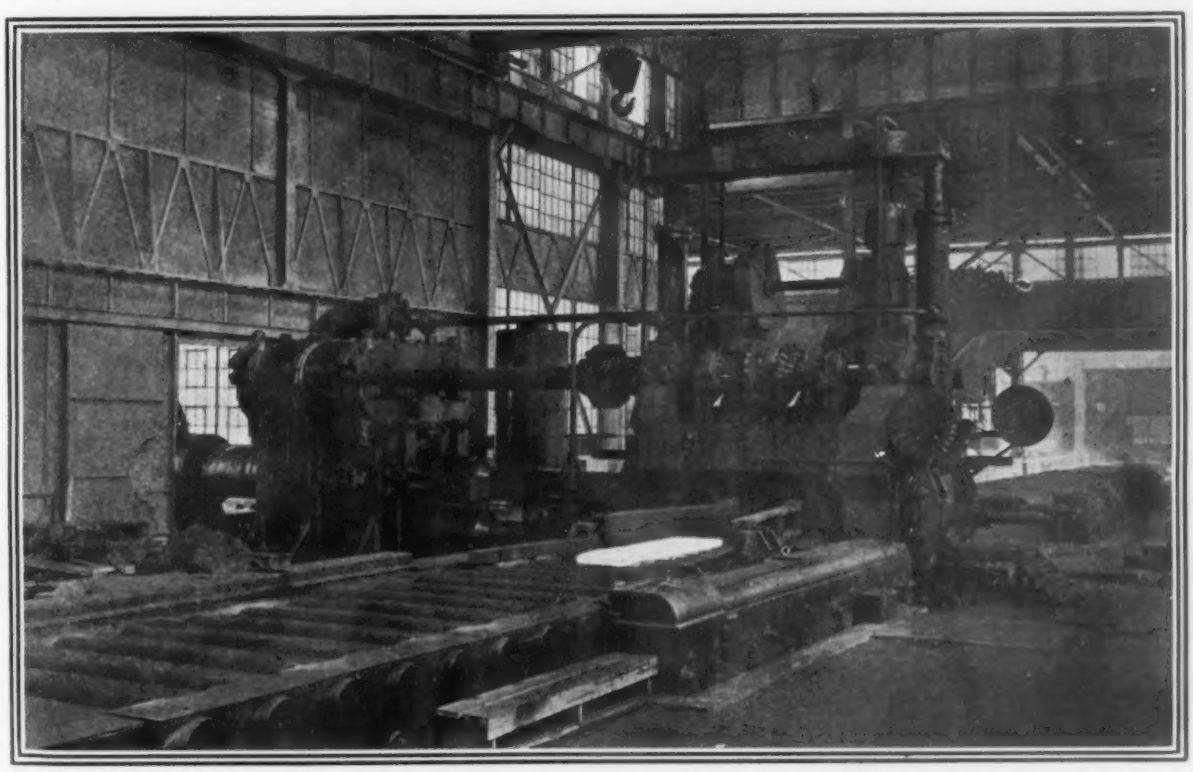
The 30-in. universal plate mill was designed and built by Mackintosh, Hemphill & Co., Pittsburgh. It rolls plates and skelp from 8 to 42 in. The main mill tables were designed to change to sheared plates when desired, this being made possible by removing the vertical rolls and inserting a short section of table driven by the screw motors of the vertical rolls. These motors when so connected with the short table operate it in unison with the main mill table. Plates up to 80 in. are thus rolled.

The mill, of rugged construction, is driven by a Westinghouse reversing motor with a rated maximum capacity of 8000 hp. The motor is driven by about 640 volts d. c. from a generating set comprising a 1500-hp. a.c. motor and a 1400-kw. d.c. generator, there being a 60,000 lb. cast-steel flywheel on the same shaft to absorb peaks in the load. Power from the company's power house comes to the motor generator at 2300 volts, 60 cycles, 3 phase, and is thus supplied to all the sub-stations of the plant. The entire mill is electrically operated.

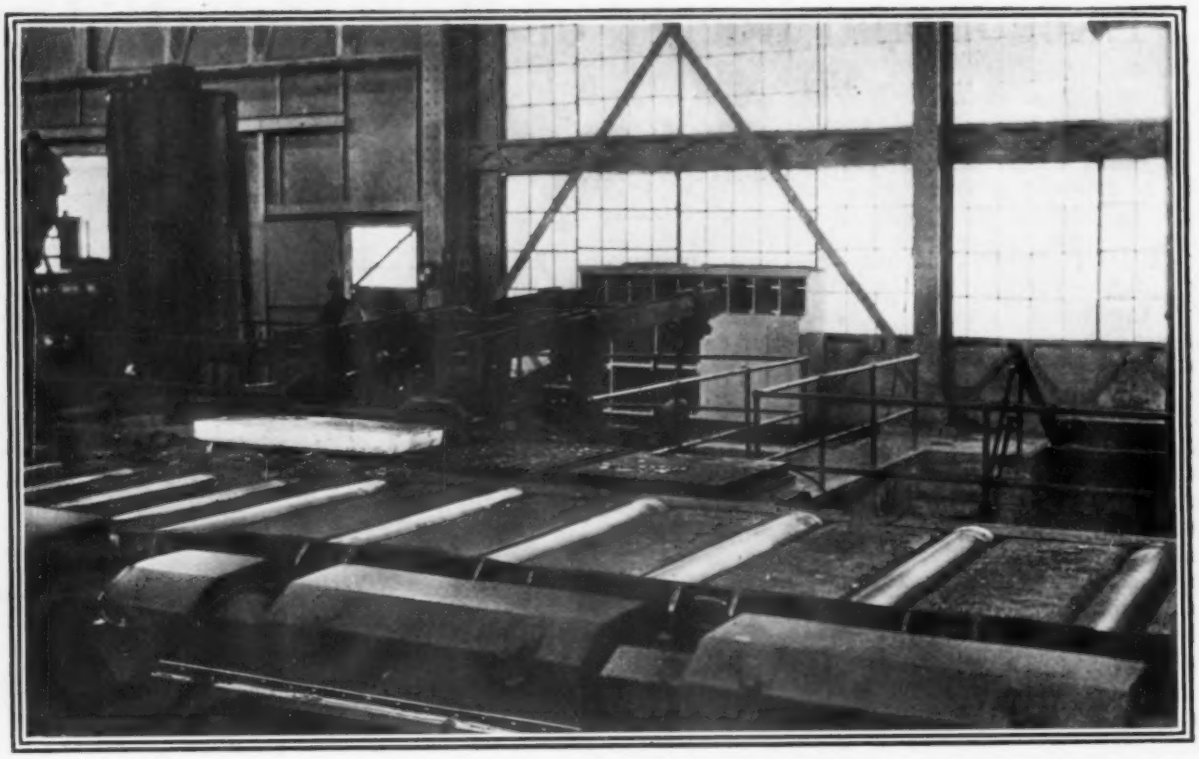
The horizontal rolls are 30 in. diameter and 7 ft. 4 in. long. The vertical rolls are 22¼ in. diameter and 3 ft. 7 in. long. Connections between the pinions and rolls are made with Mackintosh, Hemphill & Co. patented universal couplings. The pinion housing is fully inclosed. The pinions have double helical cut teeth and run in oil. The gears for driving the vertical roll shafts are driven from the main mill pinions and are contained in the same housing. The mill tables on each side of the rolls are 44 ft. 3¼ in. long and contain 25 14-in. rollers, 6 ft. 9 in. long, the tables being operated by 80-hp. motors.

In front of the mill table on the entering side is an approach table 54 ft. long, and an approach table extension of 48 ft., the latter consisting of 17 apron plates supported by 12-in. beams, without rollers, giving a total length from the center line of the mill to the end of the approach table extension of 149 ft. 3½ in., enabling the rolling of plates 150 ft. long.

The straightener approach table is 162 ft. long, and driven by two 50-hp. motors. The straightener is a Newbold machine with a capacity for plates 80



Mackintosh, Hemphill & Co. 30-In. Universal Plate Mill in Mark Plant of Steel & Tube Co. of America, whose October Production Exceeded All Estimates. The mill can be converted to roll sheared plates 80-in. wide



Electrically Operated Pusher Which Puts Slabs On the Mill Table Within a Few Feet of the Rolls, a Slab Being in Readiness As the Last Pass Is Given to the Plate Being Rolled. At the left is an electrically controlled accumulator for maintaining roll balance

in. wide and 1½ in. thick. The cooling bed, 156 ft. long and of the Aiken type, was designed and built by Mackintosh, Hemphill & Co. The plates are first conveyed to the side straightening bed, having continuous and heavy cast-iron bedplates with sliding jaws operated by screws.

The cooling bed is of ample width so that by the time the plates reach the run-out table they are cold enough to cut, this being done by a Morgan Engineering Co. shear, the lengths being then conveyed from the shear by a table to the caster bed and a Morgan side shear, where they are sheared, inspected and piled for loading.

The skelp is not transferred across the cooling bed, but is delivered from the run-in table to a cutting-off shear onto a table through pinch rollers into a skelp piler. All tables are equipped with self-lubricating bearings and all gears are cast steel with cut teeth. There is provision for a duplicate of the present cooling bed building.

Electric Buggy Carries Slabs to Rolls

A feature making for expeditious rolling is the method for handling slabs or ingots. Instead of placing them on the table by the charging crane serving the heating furnaces (although this can be done) they are placed by the crane on a motor-driven buggy or transfer car running parallel with the table, which carries the slab to within a few feet of the rolls where it rests until the mill is ready for it. When a plate has been given its last pass, in fact, before it is through the rolls, an electric pusher, manipulated by the operator of the buggy, thrusts the slab from the car to the table. Many advantages result from this procedure. Not only does it save time, but there is a saving in live run-out tables, and these can be made lighter than otherwise necessary; there is a saving in the number of rollers, the cast-iron apron plates being substituted, and the cost of maintenance is lessened.

Rolls on the universal mill have been changed in 44 min. There is a goose-neck of steel beams and castings supported by the mill crane. A coupling connected with the goose-neck fits over one end of the roll, and lifts it from the housing. The roll is then carried to one side and another roll is similarly picked up and placed in position.

Heating Furnace Door Mechanism in Tunnel

The universal mill is served by four 4-door regenerative heating furnaces, two on each side of an extension of the bloom-yard crane runway, this lay-out permitting the taking of slabs direct from the blooming mill to the furnaces without more than one handling.

Each furnace building carries one 5-ton overhead electrically operated charging machine. The peel on the machine makes complete revolutions and can thus pick up slabs or ingots in the bloom yard and place them in a furnace, or taking a heated slab from the furnace can place it on the transfer buggy running parallel with the mill tables. The furnace hearths are 34 ft. long, 9 ft. wide and 5¾ ft. to the spring of the arch. Gas is supplied by six Hughes producers. Each furnace has brick-lined doors, water-cooled frames and Knox patented skewbacks. In October the coal consumption averaged 500 lb. per ton of steel heated, about 60 per cent of the latter being charged cold.

The furnace doors operate by electrical units in a tunnel directly in front of them, thereby eliminating strain on their framing, as well as promoting accessibility. The gas and air valves are of Knox design and are operated by a unit mechanism which first shuts off the gas. After an interval of 5 sec. the air and stack are reversed, after which comes another interval of 5 sec., and the gas on the opposite side is admitted. This cycle is automatic, after a switch is thrown by the heater, and in its performance a great deal of gas is saved and it operates to prevent furnace explosions. Provision has been made for two additional furnaces.

In the open-hearth department are four basic furnaces, each of 75 tons capacity, in a building 420 x 163 ft., the width divided as follows: Casting pit section, 64 ft. 8 in.; furnace section, 83 ft. 8 in.; leanto, 15 ft. In the framework of the build-

ing are 4270 tons of steel. The furnace hearths are 15 x 36 ft.

All operating devices in the open-hearth department are in the leanto. Opposite the furnaces on the farthest side are two pouring platforms, each 160 ft. long and approximately 9 ft. wide.

Soaking Pits in Waterproofed Concrete

The soaking pit building is 83½ x 225 ft., with a leanto 45 x 200 ft. The four furnaces are in a concrete pit 79 x 200 ft., and 14 ft. 8 in. deep. The pit is waterproofed because the base of the furnaces is within 1 ft. 9 in. of datum, the water at times rising to plus 4. The pits are sub-drained, the water collecting in a sump drained by an automatically operated electric pump.

The four pits, each with four holes, are placed so that all holes are in one row longitudinal with the building, which allows all operating mechanism to be outside of the charging machine runway, eliminating danger to the apparatus from the dropping of ingots while the operation of the charging machine is free from interference.

The valves have their respective regulating stands directly back of each pit. There are two gas reversing valves, two air and four stack reversing valves. There are two gas and two air regulating valves for each hole. The reversing valve set, only one to four holes, is electrically operated, whereas the regulation of each pit is manually operated. The operating floor is at one side of the charging crane runway in the leanto, and is about 4 ft. above the top of the furnaces, not only giving a better view of operations but allowing plenty of headroom for changing valves, etc.

The blooming mill building, 308 x 63 ft., is adjacent to the soaking pit building, the mill tables projecting into the latter that ingots may be placed on the blooming mill approach table by the soaking pit crane. In the event of the transfer buggy breaking down, operations are not halted. The mill is a 35-in. Mackintosh, Hemphill & Co. mill of standard design, driven by a 15,000-hp. Westinghouse mill motor.

A two-high, 28-in. billet mill is housed in a building 58 x 374 ft.

The 10-in. skelp mill is of the Morgan continuous type, of five 2-high horizontal roll stands, two verticals in the roughing mill, one vertical in the finishing mill, three 2-high horizontals in the finishing mill and an electrically driven rotary flying shear. The mill is served by a 26 x 30 ft. Morgan continuous furnace and was built on piling at a point 1800 ft. from the former shore line, and completed in nine days within one year. It stands where there was 21 ft. of water, the total fill at this point being 37 ft.

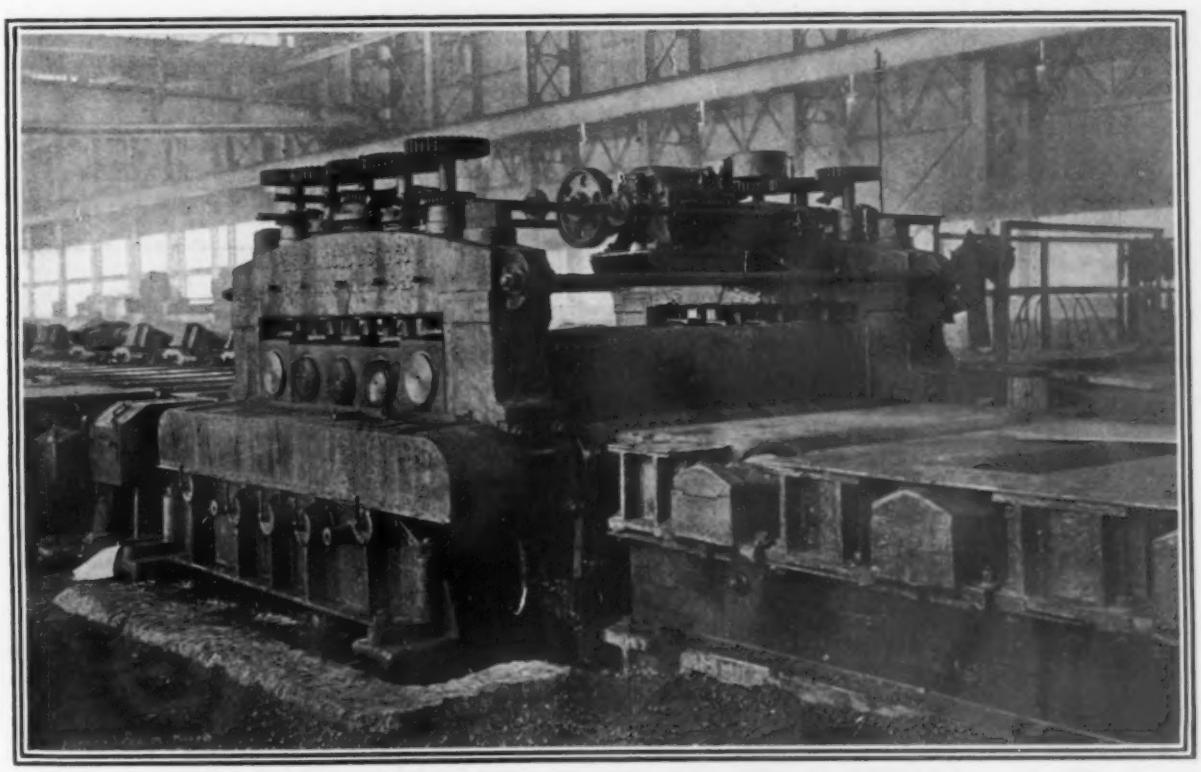
Pumps at Water Level—Concrete Intake

The main power building, of 10 bays, is 63 ft. x 220 ft., with a leanto of six bays, 25 x 132 ft. All power machines are on the main floor of the main building, all auxiliary equipment, such as pumps, condensers, air washers, air compressors, etc., being in a basement. All recording apparatus is on the main floor of the leanto. From the basement power goes to the various departments through underground duct runs encased in concrete.

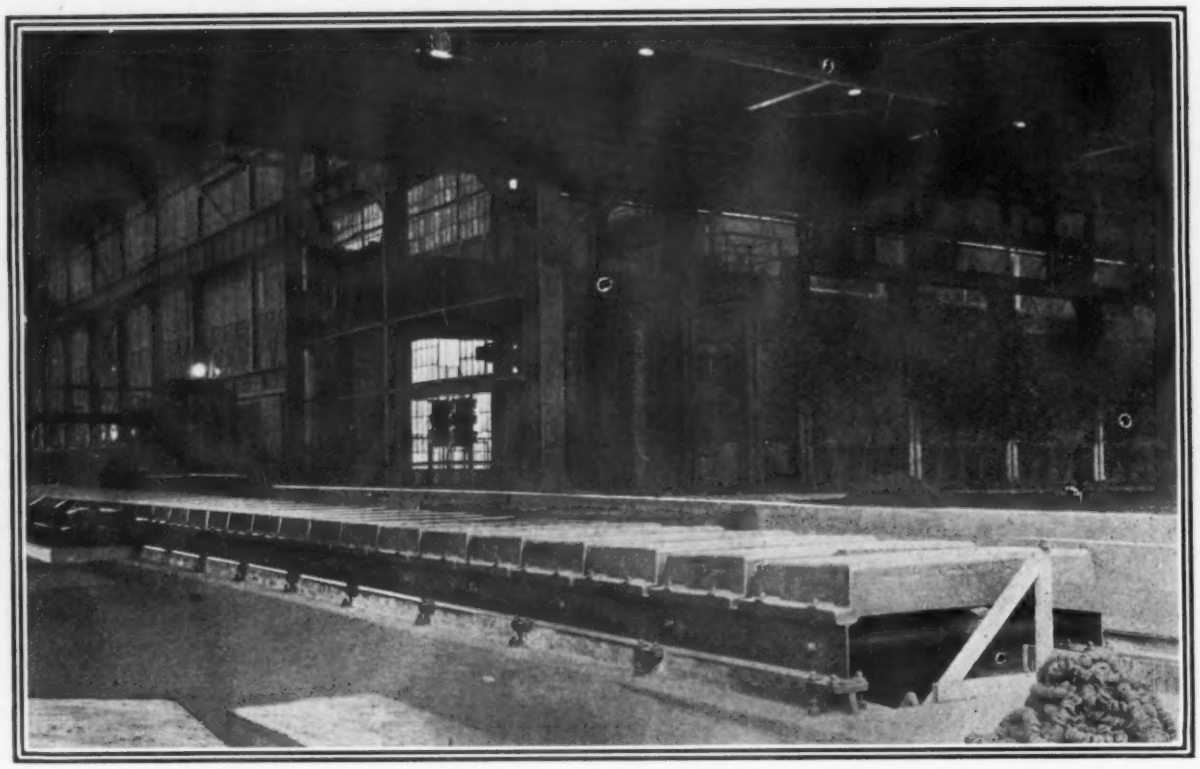
All pumps are in the basement of the main building, the water coming from the lake through a concrete intake running along two sides of the building. The pumps are elevated but slightly over the intake, an obvious advantage. All power machines are equipped with air washers on this floor, and each machine is also equipped with individual jet condensers, supplied by two centrifugal pumps, one for air and the other for the return and condensed water through the hot well from where the feed water heaters in the boiler house is supplied. The boiler house is parallel with the power house, the space between being excavated and roofed over so that steam pipes are not exposed.

The power equipment embraces 12 600-hp. boilers, six of which burn gas from the blast furnace; and two Westinghouse turbo-generators of 6250 kva. capacity and one turbo-generator of 12,500 kva. capacity, Ingersoll-Rand turbo-blowers, etc.

Arrangements for further power units are pro-



Newbold Plate Straightening Machine with a Capacity for Plates 80 x 1½ In. The straightener approach table is 162 ft. long. The entire Mark plant is electrically driven



An Approach Table Extension Having Apron Plates Is 48 Ft. Long. It contains 17 apron plates and gives a total length of table permitting the rolling of plates 150 ft. long. Heating furnaces are in the background

vided, the space they will occupy on the main floor now being filled by a section of concrete supported by steel posts, all of which can be removed. Two more 12,500 kva. turbo-generators can be added, also another turbo-blower.

The plate mill sub-station contains one 1000-kw. rotary converter, with three 365-kva. transformers; two 100-kva. transformers, stepping down from 2300 to 440 volts for a.c. current, and one 50-kva. transformer which steps down for lighting. This installation is in the main similar to that in the blooming and billet mills.

All of the mill buildings are of steel framing, and with the exception of the open-hearth building, all have siding of reinforcing material covered with cement plaster making walls 2½ in. thick. The open-hearth building has a siding of copper bearing sheets.

The windows were supplied by the Detroit Steel Products Co. Except in the motor houses, where the windows are center-pivoted because of the desirability of excluding dust, all windows slide to provide maximum openings. All roofs except on the open-hearth building are made of flat Federal cement tile, covered with 3-ply asbestos built-up roofing.

In the building of the plant, A. H. Beale, the present general superintendent of operations, was general superintendent of construction. W. T. Martersteck was chief engineer. He held a similar position with the Central Steel Co. when that company built its plant at Massillon, Ohio.

Adjusting Shell Contracts

YOUNGSTOWN, Ohio, Dec. 30.—Adjustment has been made by the British Government in the case of contracts for shell steel rounds remaining on the books when the armistice was signed, the Government paying a set price per gross ton. One maker in this vicinity had 50,000 tons of shell rounds on hand when the war closed. Much of this tonnage is being sold as scrap, being unavailable for other uses because of its special analysis, prices quoted varying from $25 to $27.

The French and Italian Governments have been negotiating for a settlement of their contracts for munitions which remained unfilled agreeing to substitute other finished products. Locally rolling of soft Bessemer bars ordered recently by the Italians has been held up until a credit arrangement is reached. It is stated no plan has been worked out to extend Italy's credit agreement with this country after Jan. 1, when the old agreement expires.

The Columbia Steel Works, Ltd., Port Moody, B. C., formerly known as the Port Moody Steel Works, Ltd., is turning out considerable pig iron from its electric furnace, most of it being shipped to Japan. The company expects to commence the operation of its rolling mills shortly, turning out steel rods and bars.

Removed from Conservation List

The ink had hardly dried on the recent announcement of the new export conservation list when the War Trade Board announced the removal of the following iron and steel items: Billets, blooms, ferrosilicon, ingots, pig iron, all classes of plates, rails over 50 pounds per yard, shapes, sheet bars, slabs, and spiegeleisen and steel alloys, also molybdenite and monazite nickel, tin (including scrap and metallic pipe). The board also announced that the restrictions hitherto existing on the exportation of tin and tin plate have been removed, as a necessity for strict conservation of tin and its products no longer exists. If, therefore, applicants will refile applications for which licenses have hitherto been refused these will be given immediate consideration, says the statement of the board.

Furnace operators in the Mahoning Valley report large ore stocks on hand and heavy reserves at Lake docks sufficient to last well into 1919. Conditions in this respect are much improved over last year, when one company had 5000 cars snowbound between Youngstown and the lakes, and another 6000 cars. Improved transportation and open weather are responsible for the betterment.

A New Departure in Rolling Mills

Neither Lifting Tables Nor Reversing Drive Employed — The Design Developed by Mackintosh, Hemphill & Co.

A rocking rolling mill, requiring neither lifting tables nor a reversing drive, is soon to be manufactured by Mackintosh, Hemphill & Co., Pittsburgh. The mill has been developed by Joseph E. Fawell of that company, who has obtained patents in the United States and nearly all foreign countries.

While a great many improvements have been made in recent years in mill building, such as much heavier construction to meet the ever-increasing tonnage demand; the increased use of steel in place of iron; better grades of material; improved lubrication, etc., practically all of these changes have been for the purpose of making existing types of mills more efficient, and there have been few, if any, radical departures in mill construction.

The mill here described is of special interest, therefore, in that it is entirely different in construction and operation from the two principal types of mills now generally used both here and abroad—namely, the two-high mill with reversing drive and the three-high mill with lifting tables and a continuous drive. The object sought in designing a mill of the rocking type was to combine in one mill as many as possible of the desirable features of the two-high and three-high types of mills, and at the same time avoid the necessity of using a reversing drive to change the direction of rolling in the case of the two-high mill or the employment of lifting tables for the same reason where the mill is three-high.

The rocking mill, as Mackintosh, Hemphill & Co. call the new type, differs from the usual type of mill on account of the fact that a combination of fixed tables and a continuous direction drive is used.

In order to obtain a clear idea of the principle on which this mill operates, we may refer to Fig. 1. To the left is shown the position of the housing and rolls for one direction of rolling and the drawing at the right shows their position for the reverse direction.

To set the mill for the reverse direction of rolling, the circular housings are rocked through an angle of approximately 48 deg., bringing the other pair of rolls into the vertical position, and as this pair of rolls is continuously running in the opposite direction from the other pair the mill is set for the reverse direction of rolling.

It will also be seen from Fig. 1 that the top roll of the inoperative set acts as a feed roller to carry the piece being rolled onto the main mill table. While as in Fig. 1 the piece is being reduced on the near side and delivered over the top of the inoperative roll, the mill could be operated the opposite way by simply running the main motor continuously in the opposite direction, and entering the piece over the inoperative top roll and reducing in the pair of rolls farthest from the entering side. However, the builders believe that the method of Fig. 1 would be preferable in most cases.

Referring to Fig. 2, a cross section through the rolls, the method of shifting the mill may be more clearly seen. The main housings are rigidly tied together by separators, and the housings rest on rollers which are carried in the main base plate. When the mill is shifted the bottom separator comes into contact with the stop on the main base plate, thereby regulating the movement, so that the inoperative pair of rolls comes exactly into the vertical position. A cushioning device is provided consisting of air dash-pots with choke valves which can be closely regulated to insure the prevention of any jar when the separator comes into contact with the stop on the main base plate, when the housings are shifted. The shifting and cushioning mechanism can be electrically or hydraulically operated as desired. This mechanism would be located on the floor beside the fixed tables, where it would be accessible.

The type of mill represented by Fig. 2 has fixed rolls, and would be used on sections ordinarily rolled on three-high mills. However, in contrast to the three-high mill, where the middle roll is in contact with the steel at every pass, while the top and bottom rolls touch the steel only at every other pass, in this mill all four rolls are in contact only every other pass, thereby making the wear even on all the rolls. As the rolls are two-high there would be no blank passes, and the diameters of the rolls, it is claimed, would be practically equal at any one pass, eliminating to a large extent the inevitable slip, where the roll diameters differ to some extent. There would also be considerable advantage, it is further claimed, in handling certain sections, such as rounds on fixed tables, as they could be more readily manip-

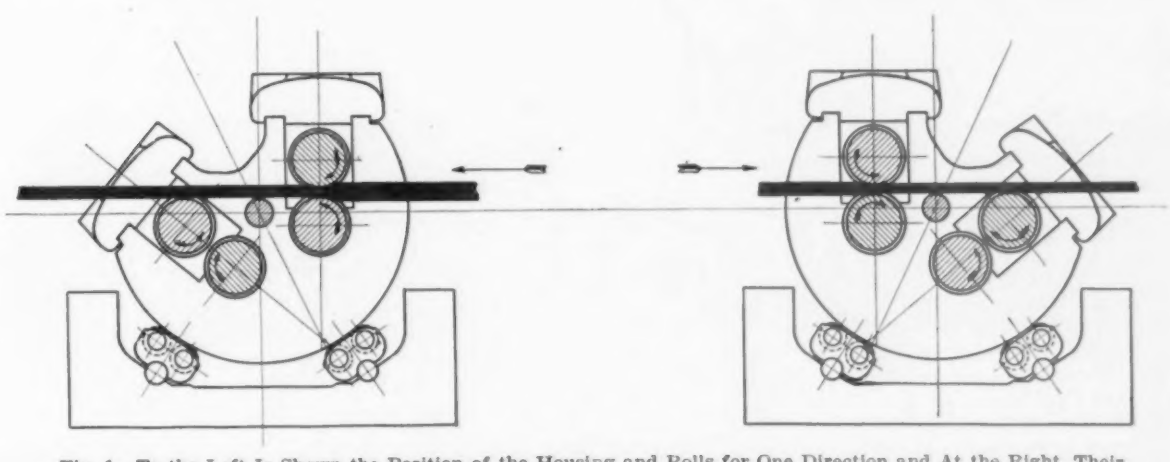


Fig. 1—To the Left Is Shown the Position of the Housing and Rolls for One Direction and At the Right, Their Position for the Reverse Direction

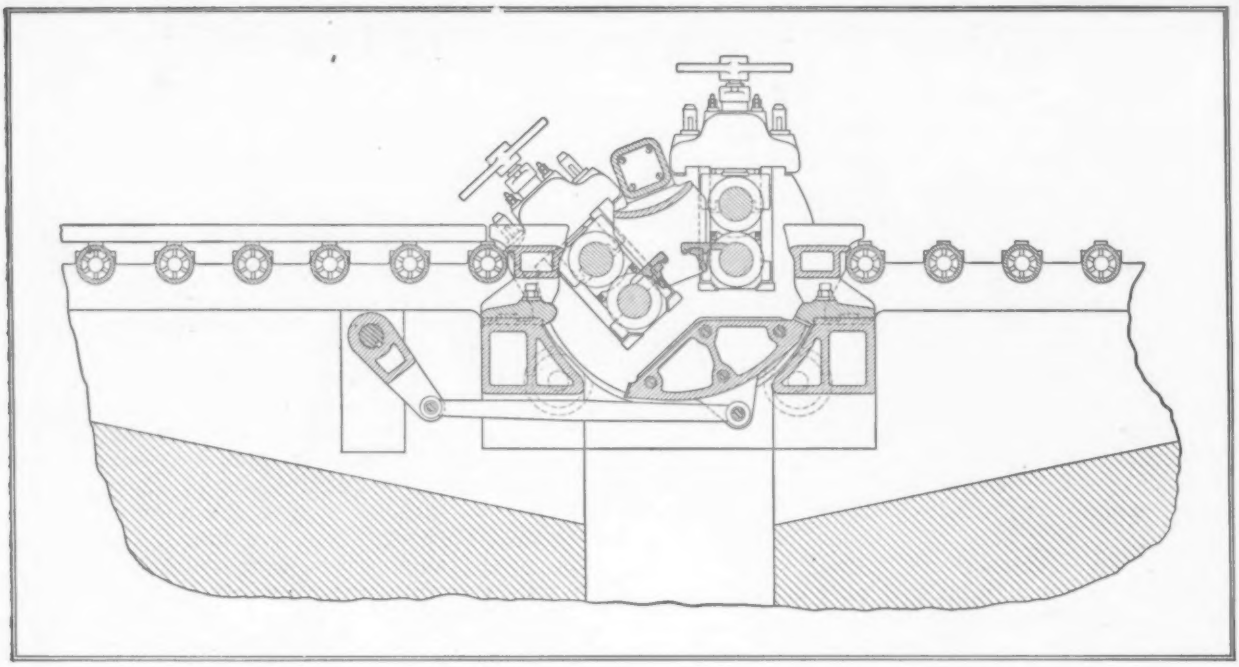


Fig. 2—Cross Section Through the Fixed Roll Mill, Showing Stops on Main Base Plate. When the mill is rotated to the reverse position, the bottom separator comes into contact with the stop and the operative set of rolls is in exactly vertical

ulated and the bar would enter in a straight line with the pass instead of at an angle as on a tilting table.

Fig. 3 indicates the type of pinion housing required to drive the mill. It will be seen that there are two pairs of main pinions, the upper pinion of each pair having a gear keyed on. These gears mesh, giving the proper direction to the four main pinions. The continuous running motor or engine drives the pinions through the wobbler on the extended shaft shown. The housing itself is stationary, and would be of the ordinary enclosed type. The vertical centers of the main pinions are located at the proper distance from each other to give a straight line drive through the spindles to the rolls when they are in operative position. The spindles are always in alignment with the main rolls when they are in an operative position and are only at an angle when turning the idle pair of rolls.

Figs. 4 and 5 show the complete arrangement of the mill. The thrust bearings are set in the main base plate and can be seen clearly in these illustrations. The housings are firmly locked when in the working position.

Fig. 6 is a cross section through the main rolls similar to Fig. 2, with the exception that the top roll is provided with a screw-down mechanism for raising or lowering the top roll. The lift of the top roll would be limited to about 6 in. on account of the fact that it acts as a feed roller, and, therefore, the top surface should always remain pretty close to the top of the table rollers.

However, as the center line through the main rolls of the inoperative set is not at a right angle

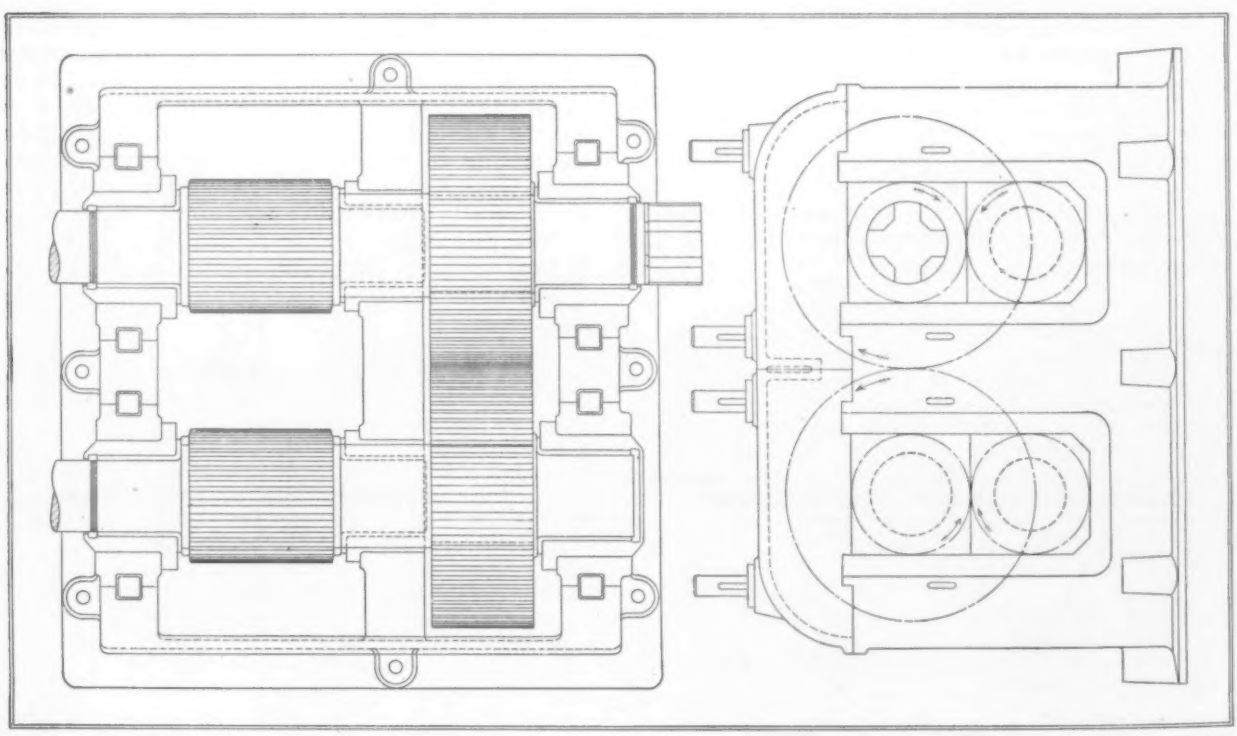


Fig. 3—Type of Pinion Housing Required to Drive the Mill. The drawing at the left is an end elevation of the pinion housing, the other is a plan view with the cap removed. The two large gears are keyed on to the top main pinion shaft

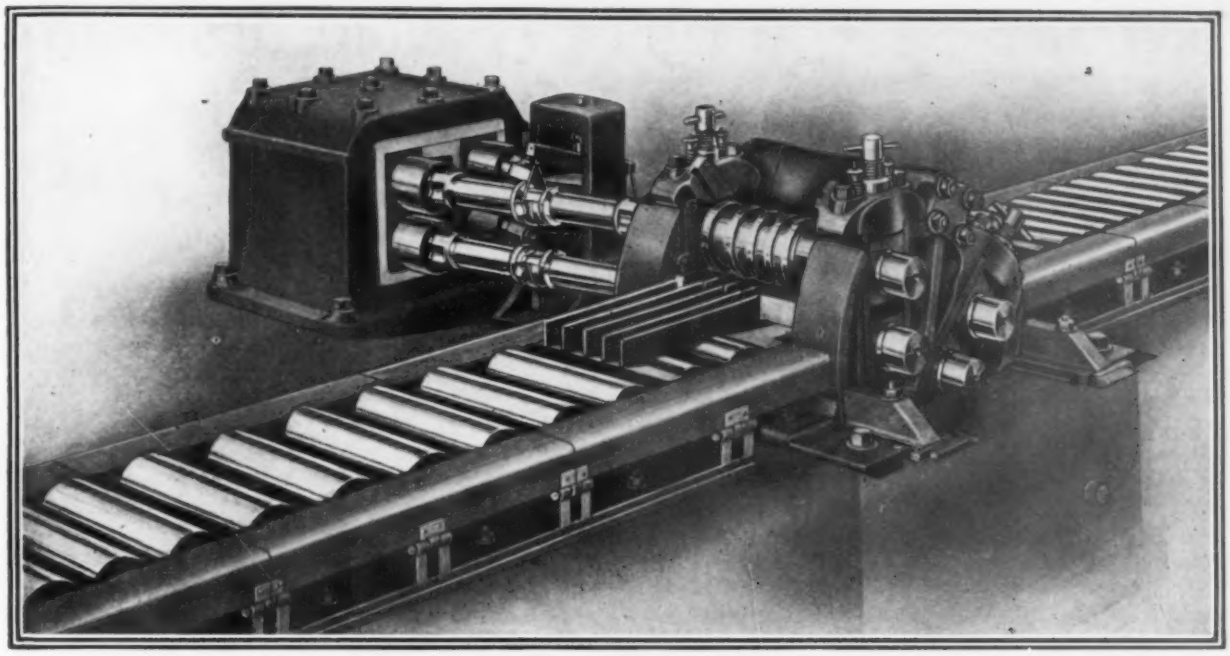


Fig. 4—Position of Spindles When Driving the Main Rolls in the Operative Position. Each spindle is balanced by the corresponding spindle opposite it

to the line of feed, this condition is considerably helped and the angle between the housing windows can be so arranged that the top roll is just about level with the line of feed when at the top position and level with the tops of table rollers at the bottom position. In regard to the mechanism for indicating the amount of opening between the rolls, a design has been worked out whereby there would be two stationary dials, which would show the opening at all times, regardless of the position of the housings.

In considering the field where a two-high mill with approximately 6 in. travel of the top roll would be applicable, it might be well to consider the work which some of the so-called intermediate mills, such as universal mills and plate mills, are now doing. The universal mill in particular is usually a two-high mill with two horizontal and four vertical rolls and is driven by an expensive reversing drive, either motor or engine. As a rule these mills take slabs from 3 to 5 in. thick which have previously been rolled from an ingot either in a blooming or slabbing mill and roll them into universal plate. Mills rolling only slabs as their raw product require but a small amount of travel for the top roll. Of course on this type of mill the vertical rolls would be in a separate housing and as close to the horizontal rolls as possible.

As the rolls of the rocking mill rotate continuously in one direction only, it is claimed to be an ideal application for the alternating current, wound rotor, induction motor drive. This makes it possible therefore to use what is considered by the builders to be the simplest and most efficient motor drive that has yet been devised to drive the main rolls of a rolling mill.

The reversing drive, used on the ordinary too-high reversing mill, includes not only the main motor, which is usually of the double type in order to reduce flywheel effect, but also includes a large motor generator set with flywheel to transform and equalize the power taken from the power circuit and a smaller set which provides the excitation for the other machines. The large number of machines and electrical connection in the reversing-drive mill make it expensive as compared with the

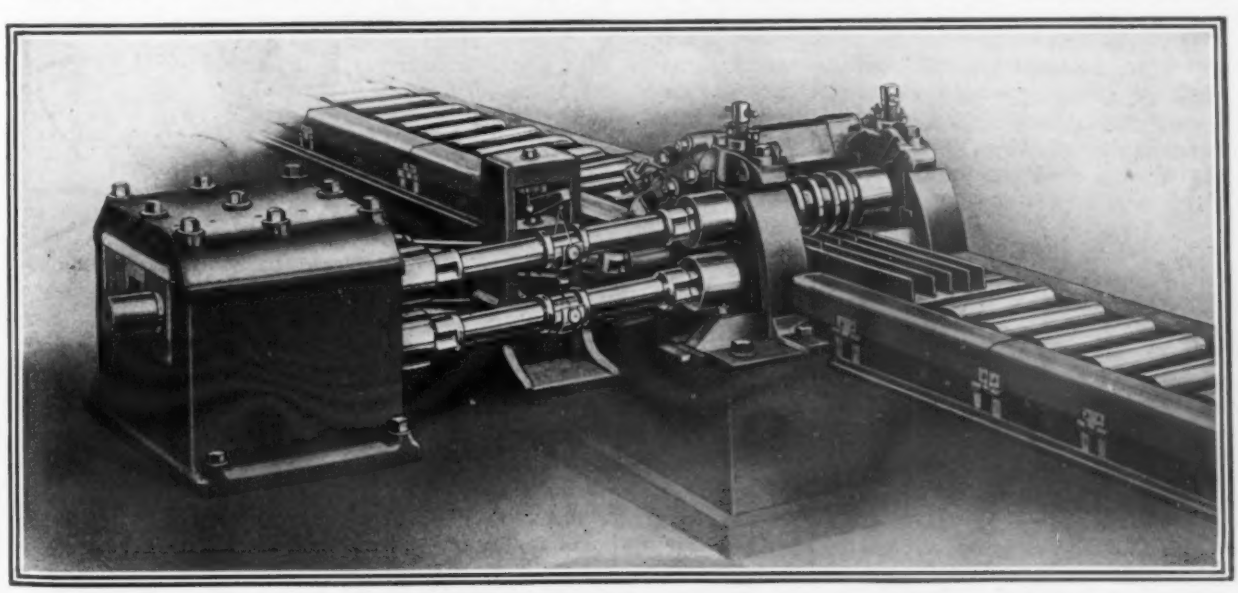


Fig. 5—A View of the Mill from Pinion Housing Toward Roll Housing. Shows straight line drive of spindles when rolls are in operative position

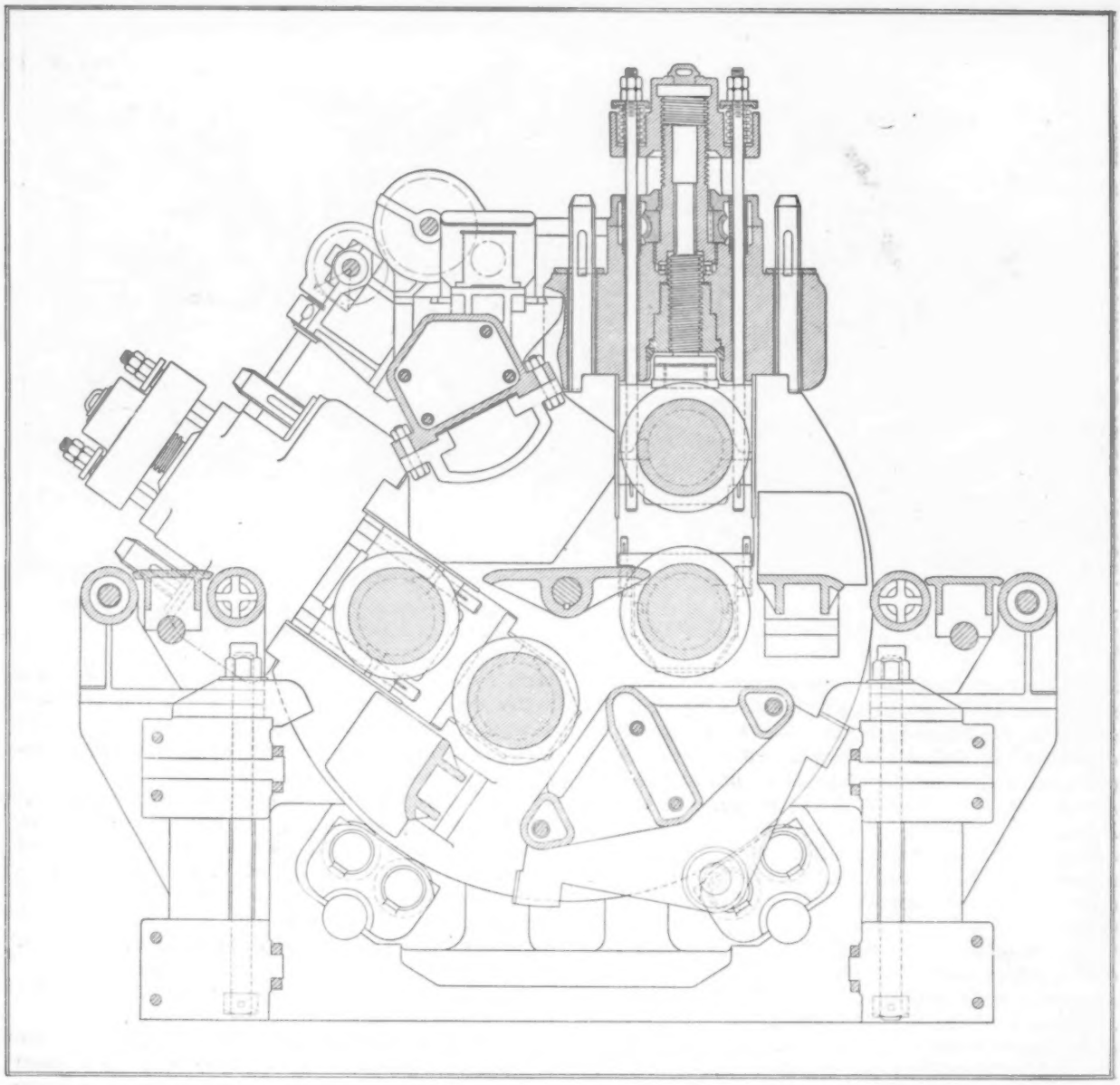


Fig. 6—Cross Section Through Mill With Screw Down or Adjustable Top Rolls Suitable for Rolling Medium Size Ingots Into Billets or Slabs. The apron plate between the two sets of rolls in this case remains stationary as the shaft supporting it is on the center of rotation and is firmly secured to the main base plate. The screw-down is self contained and does not require hydraulics

single-unit continuous running motor. This initial cost, however, seems to be well justified in certain cases by the results obtained.

It is the opinion of the inventor of the rocking mill, however, that on mills rolling medium-sized ingots or slabs, or even certain sections, it would be very desirable to have a mill with six tables and a continuous running motor. Such a mill, it is pointed out, could be safely built of lighter construction because all the shocks of reversing are done away with. On such a mill the cost of the motor would be still further reduced by the use of a comparatively high-speed motor in conjunction with a geared drive. While the cost of the gear drive would probably absorb the saving on the higher-speed motor, there would be a high electrical efficiency and power factor. Of course the flywheel would be used to equalize the load.

The Cleveland Crane Plan

During the past nine years employees of the Cleveland Crane & Engineering Co., Wickliffe, a suburb of Cleveland, have been receiving checks from the company representing a share of the profits of the year, distributed as a bonus for faithful service. It has been figured on a percentage basis. To each employee who has not been absent from work more than one day each month during the year 2 per cent of his yearly wages has been paid for each full year that he has been in the employ of the company. A man who has been with the company for 10 years receives 20 per cent of his yearly wages.

The men receive their bonus check on July 1 and Dec. 24. Some of the checks this year range from $400 to $500.

To Find Work for Soldiers

YOUNGSTOWN, Ohio, Dec. 30.—To find suitable positions for returning soldier boys a special manufacturers' committee has been named here, consisting of Walter Meub, secretary to the president of the Youngstown Sheet & Tube Co., chairman; George E. Dudley, financier; A. C. Cook, claim agent of the Carnegie Steel Co.; W. F. Perry, industrial engineer of the Brier Hill Steel Co.; S. S. French, general manager of the General Fireproofing Co., and J. N. Reese, assistant to the second vice-president of Republic Iron & Steel. Jobs will be found for all soldiers and sailors.

The Cleveland Milling Machine Co. announces that W. P. Sparks is its representative at Indianapolis, with office at 316 Terminal Building.

American Industry's Part in the Great War

War Machine Rebuilt and Its Efficiency Increased —Quickly Organizations Have Dissolved—Present Status and Plans of Boards at Washington

BY OSWALD F. SCHUETTE

WASHINGTON, Jan. 1.—America's first line of offense in the great war was our army in France. The second line of offense was America's industry at home.

Nor can the history of the winning of the war be written without long and eloquent chapters to tell of the work which American industry did to make that winning possible. Inspired by the same high purpose which nerved our men in the trenches, this soldiery of peace fought against difficulties and obstacles to make up for years of unpreparedness by the speed with which it mobilized our resources and by the enthusiasm and energy with which it accomplished things that seemed impossible.

A year ago governmental direction of this industry was in the making. Washington was the gathering place for a long and varied list of boards, bureaus, administrations and committees. The task was a new one. There were no precedents to go by. There was neither strategy nor plan that could be dug out of the history of previous wars. Even the experience of the Allies shed little light upon the methods that could solve the problem.

The general staff of American industry had to work out its own solutions. All it knew was the size of the problem. It knew what enormous masses of material would be needed to equip our armies, to move them to France, and then to supply them and the Allies as well for the terrific fighting which it knew would come in the year 1918. Few of the men who labored on the program at that time dreamt that it would be the decisive year and that within 12 months their task would have been accomplished in a wave of triumph and they and their industrial general staff would be demobilizing to fight anew on the battlefields of peace.

Dissolving Organizations

Many of the organizations which were hurriedly put together in the winter of 1917-18 to meet the great emergency of industrial preparation have already gone home. Others are writing their reports and cleaning up their files ready to say goodby to Washington. Statisticians and secretaries are compiling volumes of data and information of the work which has been done, because much of it will be of important interest to the industries of peace.

The chief work of this industrial mobilization was done by the War Industries Board—headed by Chairman Bernard M. Baruch—and a long series of affiliated and subordinate organizations. It was the task of this board to stimulate every line of industrial activity that could produce war material, and then to concentrate the output into actual war lines. To make this possible, it had an elaborate process of priorities and preferences by which it could force to highest speed the industries that were most important. Then it had other machinery to scale down the less essential industries and to prevent their interfering with the master aim of winning the war.

The Steel Industry

Take the steel industry, for instance: Its management was in the hands of J. Leonard Replogle as Director of Steel Supplies. First came the stimulation of output of ore, and co-operation with the United States Fuel Administration to get coal and coke for the furnaces. To make this possible, it was also necessary to co-operate with the United States Railroad Administration to stimulate transportation, with the Department of Labor to get workmen, and with the Treasury Department to get financial support. Then came the Pig Iron Section, which mobilized all the factors in this branch of the industry and made possible the record-breaking output of pig iron despite the handicaps of last winter's terrific offensive against outdoor industry. This section, under Director Jay C. Lauchlan, allocated the pig iron to the steel mills and the Steel Section saw to it that every ton of steel was used to secure the greatest possible production in war necessities.

It became apparent early in the year that a mere stimulation of output would be of little value in meeting the enormous requirements of war industry at home and the war itself abroad. So the Priorities Division stepped in to concentrate its allotments of steel and other materials, of fuel, of transportation, of labor and of finance where they would be of the greatest value. This was made possible by a co-operation of the war organizations in Washington. It drew up long lists of preferred industries and preferred plants in strict order of precedence.

At the same time the Conservation Division worked out retrenchment orders against every industry that could be scaled down without crippling war industry. Everywhere it was a case of saving steel—from automobiles down to the manufacturers of pens. The former, for instance, were ordered to get on a 100 per cent war business Jan. 1, 1919, and scale down to the bone in the meantime.

Price Fixing Committee

To prevent all of these restrictions from playing havoc with prices the Price Fixing Committee set the prices for all important industries. Then came the distribution of the finished products. For the steel industry there were chain, automotive products, crane, electrical and power equipment, hardware and hand tool and machine tool sections. Other industries were similarly organized. These sections had the task of again concentrating the output as well as allotting these important items to the industries which needed them in the further preparation of war material. Under it all was the unanimous co-operation of the industry itself. In many ways the iron and steel industry was a model for the others. On the whole it gave less trouble to the war organizations because of the voluntary spirit in which everything was done. The so-called general committee of the American Iron and Steel Institute, made up of the biggest men in the industry, worked in complete harmony with the War Industry Board officials as well as with the War and Navy Departments, the Railroad, Fuel and Shipbuilding Administrations. In most cases the control of the industry was handled by this committee. The Steel Section chiefly worked out the problems to be met, called in the representatives of the steel mills and the furnaces and left it to them to solve the problem. The allocations, as a whole, were made with the voluntary acquiescence of the industry and to aid it in handling the war problem to the greatest advantage. Prices were fixed with the active co-operation of the same committee and here again there was no hitch.

Although the war work of these organizations ended with the signing of the armistice there have been sug-

gestions that various portions of the machinery could be utilized to stabilize the reconstruction. Where this is possible of accomplishment by turning over existing machinery to permanent Government departments, it has been done, but the great machinery of the War Industries Board has disappeared. The Price Fixing Committee, despite every suggestion, cut off price fixing, effective Dec. 31. An attempt by the steel industry to obtain even unofficial sanction for a reduced price list for the first quarter of 1919 was vetoed. At the same time the Priorities Division has canceled all preference lists and the Conservation Division has revoked all restrictions and released manufacturers from every pledge that they had given.

Some of the work of the Conservation Division, particularly that which promises genuine economies by standardization, has been turned over to the Department of Commerce.

Information Transferred

The research work and the information that has been gathered by such divisions as the Ferro-Alloys Section is to go to the Bureau of Mines and the Geological Survey in the Department of the Interior. In these cases, however, it is chiefly a matter of transferring data. The experts who worked for the War Industries Board at a dollar a year have gone back to their $10,000 and $20,000 a year positions in industry. Nor are they likely to be tempted to stay in Washington at the $2,000 a year salaries which Uncle Sam thinks ought to be enough to get expert engineers. It was a patriotic call of the war that brought them to the Nation's capital in the hour of the Nation's need. Now they are going back to work for a living again.

The statistics and the information which have been gathered by these various bureaus are being carefully compiled. With them will go elaborate reports not only of how things were done but why. It is this feature that ought to make the final report of the War Industries Board an epoch-making, constructive contribution to the history of American industry.

The War Trade Board is continuing its operations. This is necessary because of the great importance of our foreign commerce in the stabilization of industry. But it has trimmed its export conservation list to a skeleton and there has been a revolutionary loosening of embargoes and restrictions.

The War Industries Board

The War Industries Board, the chief function of which has been to mobilize the industrial resources of the country for war purposes, ceased to function Jan. 1. The work performed by the War Industries Board has been indispensable to the successful prosecution of the war because of the fact that industrial mobilization on the gigantic basis demanded by the war and the cooperation of manufacturers and producers could only have been secured through some such medium. More actual experts in various lines of industrial activity were perhaps engaged in carrying out the policies of the board than by any other governmental organization during the war. The board was charged with the duty of procuring an adequate flow of materials for the two great war-making agencies of the Government, the War and Navy Departments, and for the two agencies immediately affiliated, the Emergency Fleet Corporation and the Railroad Administration. Another duty of the board was that of providing supplies necessary to the military needs of America's Allies and such commodities as were required by neutrals in exchange for materials essential to us. The board was confronted with the two-fold problem of stimulating and expanding production in those industries making war essentials and of protecting those industries not immediately essential to the war program. The board functioned through regulation in agreement with other executive branches of the basic economic elements, namely, facilities, materials, fuel, transportation and capital. The method of control adopted was through a preference list containing the names of industries, the output of which was essential to the war's program. Industries of first-rate war importance were regulated and controlled by the board; prices were fixed, new facilities were created and old ones converted.

During the past few weeks the various sections of the board have been gradually winding up their work and disbanding. Sections which have already passed into oblivion include the Permit Section of the Steel Division, James S. Barclay, chief; Special Advisory Committee on Plants and Munitions, Samuel M. Vauclain, chairman; Fire Prevention Section, William H. Morrill, chief; Non-war Construction Section, Donald R. McLennan, chief; Dredging Section, Nathan Hayward, associate chief; Stored Materials Section, John F. Wilkins, chief. The above sections have turned over their records and made up their final reports.

L. W. Williams, assistant director of the Pig Iron Section, has returned to his post as vice-president of Park & Williams, Philadelphia, and Jay C. McLauchlan, director of the section, has just finished his final report. The Resources and Conversions Section has been turned over to the Department of Commerce. Its activities will only temporarily be continued. The Commerce Department has also absorbed the Conservation Division, the activities of which in all probability will be permanent.

Mr. Baruch will shortly sail for Europe to advise the President of the condition of raw materials in the United States.

Vance C. McCormick, chairman of the War Trade Board, sailed Dec. 31 for Europe to advise the President concerning the economic features of the blockade. The War Trade Board will in future co-operate with the Food Administration in its program of supplying food to famished Europe and Mr. McCormick, while in Europe, will also confer with Mr. Hoover and Chairman Hurley of the Shipping Board regarding facilities for shipments of food and the part that the War Trade Board will play in carrying out this program by maintaining restrictions upon the exportation of foodstuffs.

Further Congressional sanction will be necessary, of course, for the continuance of the War Trade Board. Its chief function will probably be co-operation with the Food Administration in securing food and sufficient shipping to carry this food to the starving nations of Europe. The chief articles remaining on the export conservation list include foods and foodstuffs mainly.

The work of removing from the list manufactured commodities, iron and steel products, coal and coke, etc., has been proceeding rapidly during the last few days. The bars have been let down and the only thing standing in the way of the resumption of foreign trade on a pre-war basis is the lack of shipping facilities, which condition officials say will be alleviated within several months.

Council of National Defense

The Council of National Defense is continuing in existence as a body that can afford a connection between the Government as well as the various war organizations here in Washington and the State and municipal bodies throughout the country. The council is really the parent body of the War Industries Board, although that child outgrew it so that the parenthood was forgotten during the last year. Now the council expects to fall heir to some of the old War Industries Board functions, and particularly to much of its accumulated material, and to figure in the task of determining the future of some of the various institutions which

(*Continued on page* 77)

Plate and Structural Mills at Fairfield, Ala.

New Plant of the Tennessee Coal, Iron & Railroad Co. to Serve the Mobile Shipyard—Triplexing at the Ensley Open-Hearth Works

AN important step in the diversification of the product of the Tennessee Coal, Iron & Railroad Co. was taken when it was decided in 1917 to build at Fairfield, Ala., a plate mill and a combination bar and structural mill. This decision hinged upon another very important one, which was that the Steel Corporation would establish at Mobile a shipyard for the building of ocean freighters. Rails were the foundation of the original steel project at Ensley and the two railroads which had the bulk of the tonnage of the old Tennessee Coal, Iron & Railroad Co. forwarded that project by taking the bonds which made the first steel plant possible. Since the Steel Corporation acquired the Tennessee company in 1907, a continuous program of extensions has been carried out, all looking to greater and more economical production and ultimately to a widening market for the Birmingham district plant through diversification of product. One step to this latter end was the establishment of the American Steel & Wire Co.'s plant at Fairfield, two miles to the southwest of the Ensley steel works, and it has been a very considerable user of billets from the Ensley mill.

Work on the new plate and structural mills at Fairfield was begun late in 1917 and it is expected that the plate mill will be in operation Jan. 1 and the structural mill by Feb. 1. They are located about one mile west of the Tennessee company's by-product coke plant. There are a 45-in. blooming mill, a 36 x 110-in. plate mill and a combination bar and structural mill. Space is left for the installation of additional mills. There is ample room in the layout at Fairfield also for the future construction of blast furnace and steel works, should that be decided upon.

Hot Ingots for Ensley

The present plan contemplates the delivery of hot ingots from the Ensley steel works to the Fairfield works over a broad gage track and ingots will be taken direct from the Ensley open hearth building to the stripper building of the Fairfield works on specially designed ingot cars.

The stripper crane runway is 180 ft. long with a span of 86 ft. and a 200-ton stripping crane is provided. There are four 4-hole soaking pit furnaces, each hole being 7 ft. x 10 ft. This building is 300 ft. long, 86 ft. crane span, with a 35-ft. lean-to over the valves for its entire length. The capacity of the charging crane is 15 tons. The top of the pits is approximately 6 ft. above floor level. Ingots will be delivered to the blooming mill by an electrically operated ingot buggy.

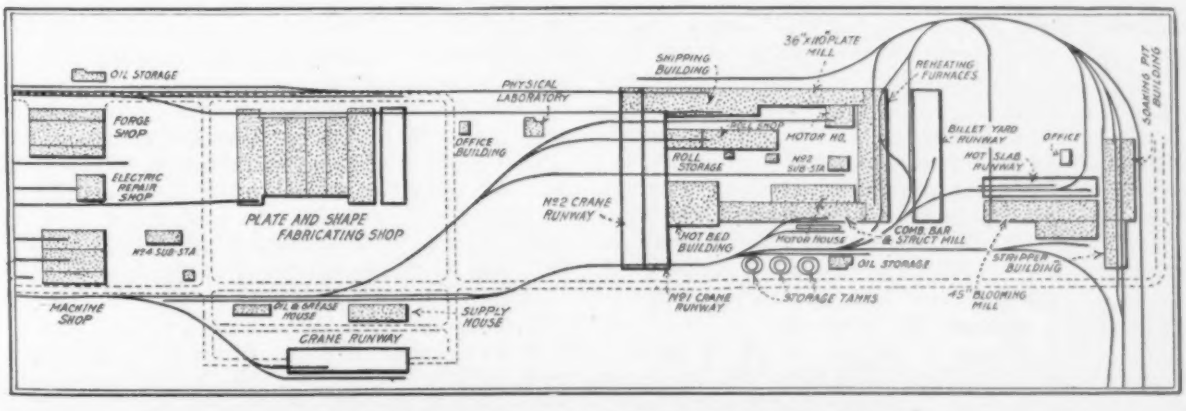
The 45-in. blooming mill is located in a building adjacent to the furnace building, 75 x 440 ft. commanded by a 50-ton crane. This mill will have a lift of 52 in., the top roll lifted electrically, and will be driven by a motor set consisting of two 2800 hp., 55 r.p.m., 900-volt motors, constituting a 5600 hp. unit of a maximum capacity of 20,000 hp. The flywheel motor generator set is made up of three 2000 kw., 360 r.p.m. generators driven by one 4000 hp., 360 r.p.m., 6600-volt induction motor, and provided with a 100,000-lb. flywheel. The mill motor, together with its motor generator set, is located in a 70 x 240 ft. motor house adjacent to and parallel with the main mill building and there is an overhead traveling crane of 50 tons capacity.

A Special Electric-Hydraulic Shear

For shearing the slabs and blooms there is a 1200-ton hydroelectric shear of a capacity to cut a slab 12 in. in thickness by 44 in. in width.

When the company began considering the shearing equipment for the new blooming mill, it was decided that a maximum slab 12 in. x 44 in. must be cut and that the same shear must also be able to keep ahead of the mill when rolling about 8 in. x 8 in. blooms which have to be cut into comparatively short lengths. This combination of capacity with speed is not easily obtained in the usual type of shear. A geared shear would be too slow. Hydraulic equipment was undesirable on account of the maintenance cost of pumps and lines. It was agreed that a steam hydraulic shear was the type that would best meet the unusual requirements. But as electrical equipment had been decided upon for all other operations and a steam hydraulic shear would have required the building of its own boiler plant, the problem was difficult.

The United Engineering & Foundry Co. thereupon suggested that by substituting an Ilgner reversing drive with rack and pinion motion for the steam cylinder of a steam intensifier, approximately the same action could be obtained as with steam, and the shear could be motor operated. For some time the United company had been considering the



General Plan of Tennessee Company's Plant at Fairfield

possibilities of this method in connection with hydraulic forging presses, and was so far convinced of its feasibility that sketches had been made and patent applications entered. From this it was a natural step to the electric-hydraulic shear, and this suggestion was accepted.

The attached diagram illustrates the principle of the shear. *A* is the main ram of the press connected by direct hydraulic line with the intensifier cylinder *B* through valves *C*, *D* and *E*. *E*, *F* are balance cylinders directly connected to an accumulator provided for this purpose, for the gag cylinder, and to hold the valve *E* closed. This accumulator requires no water supply except to make up leakage. *G* is a prefilling vessel containing water under an air pressure of about 60 lb. *H* and *J* are the rack and pinion which propel the intensifier ram; the pinion *J* being directly connected with the reversing motor of the Ilgner set. The remainder of the diagram consists of the usual shear parts.

The maximum opening of the shear knives is 26 in. and the intensifier has sufficient displacement to move the knives 14 in. at one stroke; but as the knives can be held at any desired opening, it is evident that all ordinary shearing will be done by a single stroke of the intensifier. Only large blooms over 12 in. square will require more than one stroke of the intensifier to shear, and in no case will more than two strokes be required. The balance cylinders have sufficient power to raise the shear head against the pressure of the prefiller tank.

The operation of the shear is then as follows: Starting with the knives together, the valve *C* is opened to allow water to pass from the main cylinder to the prefiller, which allows the knife-head to rise. When sufficient opening is obtained the valve *C* is closed, the bloom run under the knives and the motor started in a direction to force water from the cylinder *B* to *A*. If the bloom is more than 12 in. thick the lever *K* is placed in position to close both valves *C* and *D*, which then correspond to the suction and discharge valves of a pump, and when the intensifier reaches the end of its stroke it is reversed and more water is drawn in from the prefiller to be forced through the valve *D* and into the cylinder *A* on the next forward stroke of the intensifier.

When the shear is standing wide open and it is desired to lower the top knife for cutting small sections, the same operation is used as when cutting large blooms: that is, the valves *C* and *D* are both closed and the shear pumped down to the desired position, after which the valve *D* is opened and shearing proceeds by a single stroke of the intensifier.

The valve *E* is a relief valve held down by accumulator pressure and designed to exhaust water from the high pressure system into the prefiller. It operates only as a safety device in case the electric control gear fails, and has nothing to do with the normal operation of the shear.

The electrical equipment was furnished by the General Electric Co. and is a standard Ilgner drive consisting of a 450-hp. alternating-current motor with a 600-kw. flywheel generator and 700-hp. reversing motor. The control is somewhat special, although built up from standard elements. The control lever *L* is connected through mechanism equivalent to a 'floating lever" with the pinion shaft *J*, and the floating fulcrum connects to the controller which actuates the reversing motor. This floating lever connection causes the intensifier ram to move either forward or back in proportion to the movement of the lever *L*, and gives the same nicety of control as with steam hydraulic presses.

In the steam hydraulic presses all the movements of the press head are controlled by a single lever, but in the case of a shear it is not frequently necessary to change the opening of knives, and by using a separate lever for this purpose the manual effort necessary for the frequent shearing operations is greatly reduced; hence the two control levers.

From the above it will seen that the position of the intensifier is always determined by that of the hand lever, and therefore it cannot go beyond its proper limits of stroke. A schedule of operation has been worked out showing the number of strokes which can be made under varying conditions of knife opening and shearing pressure, from which it appears that the rapid operation of a steam hydraulic shear can be closely approximated.

Slab and Ingot Heating Furnaces

Between the blooming mill and the finishing mills is a stock yard 500 ft. long commanded by a traveling crane of 100 ft. span having 25 tons capacity with a 10-ton auxiliary hoist. Adjoining the stock yard and parallel to it is the reheating furnace building in which are eight furnaces serving the plate mill and the combination bar and structural mill. When heavy plates are being rolled heating furnaces would have difficulty in keeping up with the rolling mill. When structural shapes, particularly lighter sections, are being rolled, the heating furnaces could supply blooms faster than the rolling mills could take care of them. The combination of the two types of finishing mills tends to a continuous and balanced operation of the heating furnaces. For charging and drawing two 8-ton overhead electric slab charging cranes have been provided. The fuel used in the furnaces will be by-product coke oven gas and tar or fuel oil.

Plate and Structural Mills

The plate mill is 36 x 110 in. in size and is driven by a 4000-hp., 82-r.p.m., 6600-volt mill type motor with flywheel. The leveler for this mill has a capacity of straightening plates 96 in. wide by 1⅛ in. thick. The end cutting shear has a blade 110 in. long and is motor driven. The side cutting shear has a knife 190 in. long and this also is motor driven. There are in addition two motor-driven, vertical scrap shears and one motor-driven circle cutting shear.

The building over the plate mill proper is 400 ft. long and 62 ft. wide, provided with a 50-ton overhead traveling crane. The shipping building for the plate mill is 440 ft. long and 100 ft. wide, and has one 96-ft. span crane with two 10-ton trolleys on the bridge. The motor house is 80 x 100 ft. and is served by a 50-ton overhead traveling crane having a span of 76 ft.

The furnaces in the reheating furnace building for the heating of slabs have a hearth dimension of 10 x 42 ft., while the furnaces for the combination bar and structural mill for heating blooms and beam blanks are 14 x 42 ft.

The structural and bar mill is after the type of the cross country mill and consists of one stand of three-high, 28-in. rolls, three stands of 26-in. rolls and two stands of 24-in. rolls. The roughing mill is driven independently by a 2500-hp., 82-r.p.m., 6600-volt mill type motor, while the 26-in. and 24-in. trains, with the exception of the finishing train, is driven by a variable speed motor of 3000 hp., 6600 volt, by means of a long driving shaft with bevel gear connections to each train. The finishing train of rolls is driven independently by a 1000-hp., high speed motor, direct connected to a gear reducing set. This mill is provided with variable speed

motors arranged for rolling speeds from 500 ft. up to 750 ft. per minute, the slowest speeds being used on the heavier sections.

Roll Changing by Lifting Housings

The main mill building is 560 ft. long by 75 ft. and the motor house located adjacent and parallel to the main mill building will be 320 ft. by 60 ft. Roll changing in this mill will be done by two electric, overhead cranes. These will lift the housings with the rolls in them from the shoes and set them to one side on stands prepared to receive them; then they will be replaced by sets of extra housings and rolls previously built up and adjusted and held in readiness. By this method a great deal of time will be saved over the old method of changing the rolls with the housings in place. A 75-ton and a 25-ton crane are installed in the mill building, and in the motor house a 50-ton crane.

The mill has two hot beds, each located in a building 180 by 85 ft. Over the larger of the hot beds, designed for heavy sections or I-beams and channels, is a 5-ton crane with which to make repairs.

Adjacent to the hot bed building is the straightener building, in which the large roller straightening machines are located. A 15-ton crane is provided for rapid changes and repairs of these machines.

Two yard crane runways, each 85 ft. span, one being 676 ft. long and the other 576 ft. long, connect the shipping end of the plate mill with the shipping end of the bar and structural mill, thus permitting the loading of cars with miscellaneous products. On each runway are two cranes of 81 ft. span, having two 10-ton trolleys on each bridge girder.

The No. 2 sub-station building is located between the motor houses of the two mills, being connected with a 7 x 7 ft. underground conduit. In this building are three 750-kw. motor generator sets, together with transformers and equipment for producing direct current.

The roll shop is 280 x 60 ft. span and the roll storage crane runway is 155 x 60 ft. The usual equipment of roll lathes and grinders is provided.

Fabricating Shops for Shipbuilding

In a separate group to the westward of the mills are the shipbuilding fabricating shops, consisting of plate shop, machine shop, forge shop, bolt and rivet shop, and gray iron foundry. The plate shop building is a steel structure of saw-tooth roof construction, approximately 630 ft. by 352 ft., in which are located numerous machines for punching, shearing and working up plates and shapes that make up the hull construction of ships. The material for this work comes directly from the mills above described, and is fabricated as far as possible ready for shipment and final assembling at Mobile.

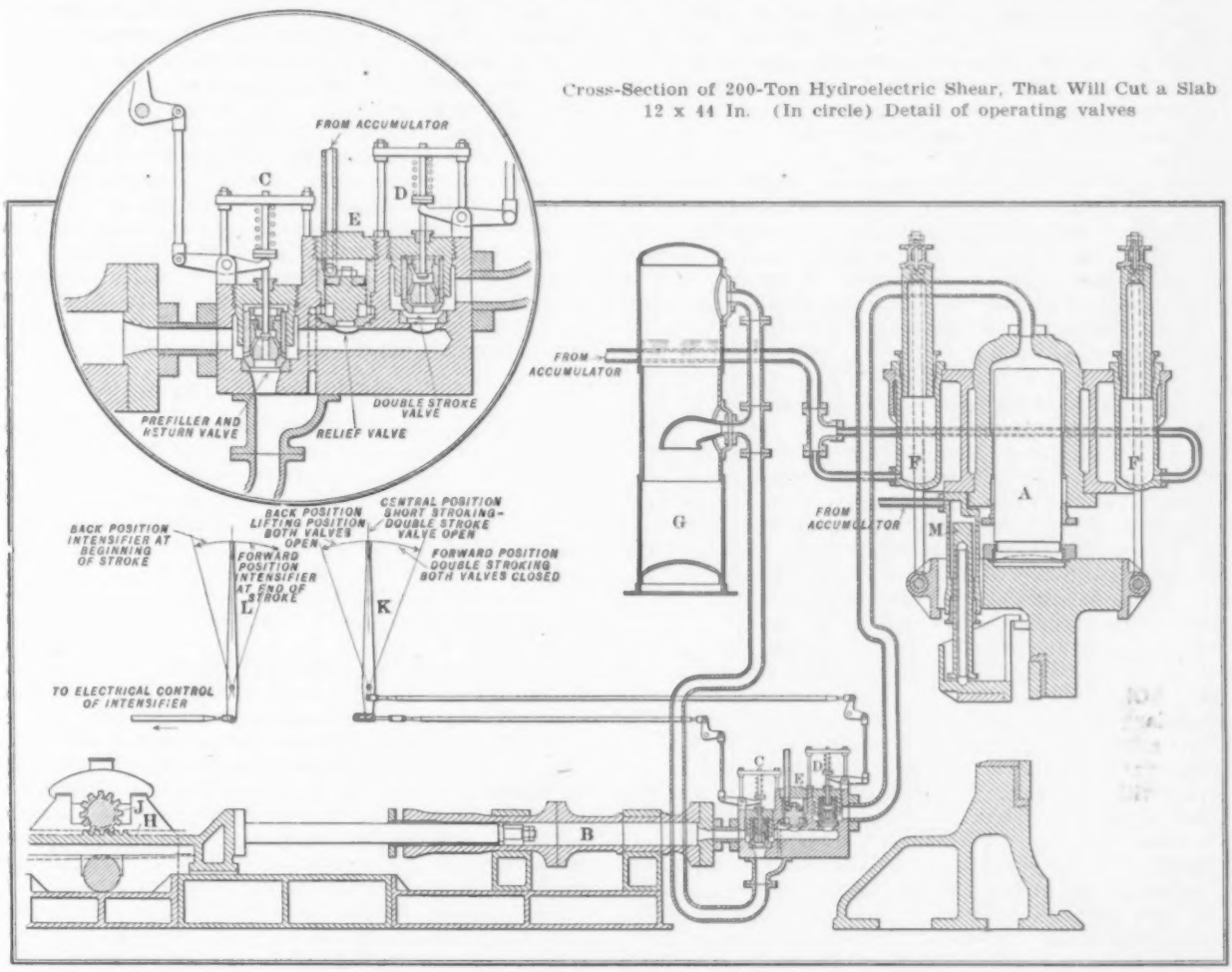
The machine shop building consists of a main span of 85 ft. with a lean-to on either side of 70 and 40 ft., in which are located heavy traveling cranes serving numerous up-to-date machines.

The forge shop building consists of a main span 85 ft. wide, with lean-tos. The building is 240 ft. long. In it is located a 1000-ton forging machine with large steam hammers and furnaces for doing ship work.

The bolt and rivet shop is 160 by 65 ft., with lean-tos of 65 ft. and 50 ft. Its machines will produce the necessary rivets, bolts and nuts for the

(*Continued on page* 103)

Cross-Section of 200-Ton Hydroelectric Shear, That Will Cut a Slab 12 x 44 In. (In circle) Detail of operating valves



Notable Features of Lake Iron Ore Trade

Important Developments in Washing—Improved Methods of Transportation—Cuyuna Range Makes Heavy Shipments—The Basing Point Controversy

BY DWIGHT E. WOODBRIDGE*

THE year just closed has been a remarkable one in the history of the Lake Superior iron ore trade. Many changes have taken place, many advances recorded, many interests have been involved. Among the notable features of the year these stand out prominently:

Complete control of the ore trade and of the railways by the governmental agencies and others; more thorough co-ordination and co-operation among shippers and the mobilization of the facilities of mines and ships; development of ore dressing; demand on the Cuyuna range for manganiferous ores; an active campaign of exploration on the Gogebic, especially in connection with the newly recognized "north vein"; the abandonment of worked-out mines, particularly on the Mesaba. These do not begin to cover the activities of the year, but they are the features that seem more worthy of comment in a general article such as this, which does not undertake to catalog details that might be of the utmost local interest and importance.

Washing of Ores

On the Mesaba range are now built or building 14 or 15 washeries; to such a growth has the original Oliver Iron Mining Co. experiment led in a comparatively brief period. The log washery which the Oliver company is to put in at the Leonidas mine, Eveleth, will dispense with all the mechanical refinements that have been considered necessary by all those who have followed the original Oliver Iron Mining Co. washer; that is, the turbo, etc.; and the new washery will have only the log, practically the original McClanahan-Stone type, with the new feature of a 35-ft. log, instead of a shorter one, as has been universal. The Coleraine plant of the Oliver Iron Mining Co. still remains far the largest and most elaborately constructed of these concentrators, but others are working against ore reserves of great importance. This is especially the case with the Butler Brothers plant, handling ores from the Kevin and Patrick mines near Nashwauk, with a combined tonnage tributary to the plant amounting to many million tons of an ore excellently adapted to washing, and from which the product is not only high in iron but low in silica. The Oliver company has developed a large tonnage of wash ore near Eveleth, and will have a very large plant there. A large rock and ore-screening plant, equipped with grizzleys consisting of a set of chains moving forward over pulleys and big enough to take the load of a 20-yd. dump car at once has been erected at Morris mine and will be in operation the coming season. An ore-drying plant has been put in at Wakefield mine, Gogebic range, although in general it may be said that mine operators have not taken as kindly to ore drying as was expected when the plan worked out theoretically. The plant at Wakefield is one moved from a Mesaba mine near Buhl.

An Important Development

By far the most important and far-reaching development along the line of ore dressing has been the completion of elaborate experiments carried on for some time on the lean magnetites of northern Minnesota, under the direction of D. C. Jackling of San Francisco, and with the New York and Boston banking house of Hayden, Stone & Co. associated as manager of the syndicate conducting the enterprise. The financial resources and engineering ability of this combination is such as to lend interest and make important any work that it undertakes, and when is coupled to this the quantity of these lean ores and what their successful beneficiation means to the iron ore industry, one cannot underrate this enterprise. An experimental mill was erected at Duluth and equipped with machines of commercial size, some of which were developed for the use to which they were put, and in October a cargo of ore was shipped to a furnace in eastern Pennsylvania. This cargo assayed 63.25 per cent iron, dry; 3 per cent moisture, and 0.008 per cent phosphorus, and was on a guaranty of 63 and 0.011. The ore from which it was made averaged about 0.05 phosphorus and in the neighborhood of 30 per cent iron. The principle underlying this experiment was that of magnetic separation, itself, of course, not at all new; but new and efficient machines have been developed and the science of magnetic separation may be much advanced by this operation on the eastern Mesaba range. The experiment has convinced those for whom it was made that the treatment of these ores is a commercial undertaking, and it is expected that a large operation will shortly be under way.

Co-operation on the Lakes

With iron ore shipments practically the equal of those of the preceding year, or nearly 62,000,000 tons, the lake ore fleet moved its tonnage more readily and more quickly than in 1917. This is in spite of the fact that the fleet was diminished by the departure of a number of ships sent out to the overseas trade. This lake ore fleet included in 1917 some 398 ships of an average of more than 8000 tons capacity; it was about 380 ships for the season just closed. The improvement in efficiency was due to the mobilization and co-ordination of the fleets, the upper lake shipping railways and docks, and the lower lake receiving piers and roads, inaugurated the previous season, but extended and perfected for the season of 1918. Ships were placed in the hands of a committee that directed their movements and the handling of all bulk freights. The plan has worked out remarkably well, and it is quite certain that co-ordination will be the governing idea among shippers in the future. Never again will there be reversion to the old system of a disregard of everybody else. A lesser number of ships than in use the year before was able not alone to carry as much ore but a greater quantity of coal while leaving the late season free for grain, of which vast quantities have been forwarded, part for immediate shipment overseas and immediate use in this country, and 28 to 30 million bushels to be held on board ship at lower lake ports for spring delivery, a sort of national food insurance store. And, though rates for the season have been under the wild rates of the year before, the earnings of lake freighters have been greater than they were in the past.

Could Handle Much More Ore

Ample equipment for the movement of far more ore than has ever been transported in any season now exists; additional railway facilities have been provided during the year, both for railroads and in the completion of great steel and concrete shipping piers, notably by the Duluth, Mesaba & Northern road. During the season of shipment an average of 6025 carloads of ore per day was handled by the various railroads serving the mines of the Lake Superior district, and of this the above road had a quota of about one-third.

The completion of iron ore shipments before cold weather released about 100 locomotives that in other years have been required for steaming frozen ore, and these were able to assist in the work of the Railroad

*Mining Engineer, Duluth, Minn.

Administration elsewhere, and were drawn away for that purpose.

The Large Cuyuna Contribution

During the season Cuyuna range shipments were almost precisely the same as in the previous year, about 2,425,000 tons; of this manganiferous ores were 700,000 tons. It is doubtful if the district would have equalled 1917 but for the intense demand for anything containing manganese. Leading shippers of this class of ore have been C. K. Quinn, the American Manganese Mfg. Co.; Marcus L. Fay, F. W. Merritt, E. N. Breitung, Ohnamen Iron Co., Oneida Mining Co. The Mahomen mine of the Quinn group has shipped in a single day 5000 tons of manganiferous iron ore, and at times as much as 1500 tons assaying 25 per cent manganese; it is the largest shipper of such ore in this country, if not anywhere. The American Manganese Mfg. Co. has produced 175,000 tons of manganiferous ore this season, and has been a considerable buyer in the market, both from the Cuyuna and from other fields, for its furnaces at Dunbar, Pa., and in Virginia. The older Lake districts have shipped a little of this ore this year. Of course, there is a good deal of uncertainty as to the future for ores running from a few per cent of manganese up to say 25 or 30 per cent, highly silicious, with iron from 25 and 30 per cent up to 40, and practically all high phosphorus. Operators not directly connected with that branch of the ore business do not enthuse over it, as a business for the future, but they all admit that furnaces have grown to use these high phosphorus manganiferous iron ores and seem to want them, and that they may have learned something about them that will permit continued and extended use, at fair prices, and they know, also, that the business has been profitable. Of course, no one looks for such prices for these ores as have prevailed the past season. If they sell it will perhaps be on a straight iron ore basis, manganese figuring as iron, which will take the cream off the business, for Cuyuna mining is not cheap except at open pit properties like the Mahomen, for example. But the 700,000 tons of manganiferous ores sent out from this range in 1918 was a boon to the iron trade whose importance can scarcely be appreciated outside.

General Valuation Reduction

For the first time in its history, the Minnesota Tax Commission has made a general valuation reduction, and this it has done voluntarily. A general hearing was held in St. Paul in December on Cuyuna range valuations, brought on in part as a result of the change impending over manganiferous ores. The larger producers, both of manganiferous ores and of iron ores, were represented and the commission recognized the justice of their position to the extent of making a slight reduction in valuations on many properties. The commission never had recognized any particular value in manganiferous ores, as such, but the trade in 1918 did so, and it was on the cards to make a decided upward revision for the 1919 tax; in fact, this had already taken place, in part. But now most of the mines are about back where they were, and some are put lower. The willingness of the commission to reduce valuations per ton, as well as to raise them, is looked upon as a happy augury.

New Development on the Gogebic

Reference has been made to the Gogebic Range and to the work of exploration and in connection with the "north vein." W. O. Hotchkiss, State Geologist of Wisconsin, who has been very closely in touch with this most important development, states that during the past year belief that the so-called north vein ore is likely to be found in many of the mines, has been strengthened. "This conviction," says Mr. Hotchkiss, "is well founded since valuable ore bodies well north of the footwall have recently been discovered in the Montreal, the Townsite, the Norrie group, the Newport, the McKinney Steel Co. mines, the Anvil, and other mines. Furthermore, several of these north vein ore bodies are of impressive size."

Mr. Hotchkiss adds that it is evident the so-called north vein ore bodies are nothing more or less than the altered portions immediately above the dikes of those bodies most readily altered to ore, incomplete investigations having disclosed that at least four different beds varying in distance from 150 ft. to over 900 ft. north of the rich productive bed on the footwall contain merchantable north vein ore bodies which partake of the general high-grade character of the better developed ore bodies along the footwall. Mr. Hotchkiss believes that there is abundant justification for a very large amount of exploration of the northern portion of the iron formation belt amounting in general to about three-quarters of its total thickness.

New and Old Mines

A good many mines are reaching their end, and a good many others are under development. Naturally, the Mesaba is seeing more scrams than are the old ranges, because production from the Mesaba is so easy, responds so readily to increased demands, and because many large consumers have mines on that range and not elsewhere, so must draw from there to the limit of capacity. The trade will be rather surprised to learn that of the 197 mines that have been opened on the Mesaba range at one time or another since its beginning, no less than 50 are now exhausted. To be sure, most of these abandoned properties never were very large, but the list includes at least one mine that has shipped in excess of 10,000,000 tons. While some mines have been utterly exhausted, we may be sure that the rest are not as fresh as they once were. And, though it may take a generation to exhaust a Mahoning at the rate of two to two and a half million tons a year, it will take but a few years to clean up a Hull-Rust at the rate of six to eight million tons a year. Eleven mines produced more than a million tons each during the season, with Hull-Rust in the lead with a total of 5,453,000 tons, against the record, its own, of 7,665,600 tons in 1916.

Since the winter of 1914 the Oliver Iron Mining Co. has been working on the preliminaries for the development of a mine under what then was Carson Lake, west of Hibbing. The lake was pumped to the muck and a shaft was started, but half of it one night floated off in the mud and all the underground equipment was buried. A section of the railway line to the shaft sank out of sight, carrying with it the railway equipment. Now another shaft is down 160 ft., and it is expected that mining will commence during the coming year.

The Moving of Hibbing

The work of removing the village of Hibbing will be carried out during 1919; the Oliver Iron Mining Co. has bought most, if not all, of the surface right on land lying north of the railroad tracks, and has established a new location. It owns the ore lying under the old town and mining is now right up to the doors of buildings. These will be moved and old Hibbing will be obliterated.

Steel making companies are still fortifying themselves with ore reserves. The Republic Iron & Steel Co. has inaugurated a new policy in connection with its mining department in the North, that of exploration. In the past it has contented itself with securing properties that had already been developed; now it is carrying on a vigorous campaign on the west Gogebic in Wisconsin, where it has a long stretch of the formation. Much drilling has been done and, while it would be optimistic to state that it has opened large tonnages, it is proper to say that the geological indications developed give sufficient assurance to warrant it in sinking shafts to find the ore at depths. Tod, Stambaugh & Co., and associates, have taken a large property on the West Mesaba, and are now opening it; the Wisconsin Steel Co. has done the same; Pickands, Mather & Co., and associates, have been extremely active on both the Mesaba and Gogebic, and have added great mines to those they operate. Others are following the same plan. Probably no independent mining interest has ever produced the tonnage in a single year that has been sent out by M. A. Hanna & Co. this season —4,360,000 tons—this in addition to the ore for which the firm is agent, Mahoning, for example. The firm's

activities this winter are tremendous. Its ownership of Wakefield has added much to its mining possibilities. Midvale Steel & Ordnance Co. now has, perhaps, a greater ore reserve comparative to its pig iron production than any other steel-making concern, with its half interest in Mahoning properties, its ownership of Penn Iron Mining, its 15 per cent of Plymouth, an open pit Gogebic mine, its 15 per cent of Scranton, near Hibbing, its 20 per cent interest in mines taken over by M. A. Hanna & Co. from the Great Northern Ore Properties, and others.

The Basing Point Problem

For a year there has been consideration in Minnesota of the method almost universally employed for fixing the prices of steel. Briefly and generally speaking, this system considers Pittsburgh as the point from which prices are figured, and works elsewhere charge for steel products the price at Pittsburgh plus the freights to the locations of these various works. Concretely, Minnesota realized that iron ores to the extent of say 50,000,000 tons a year were shipped from within her boundaries, but that when any of this ore was manufactured and sold in the State and to her people it was charged not only with the amount of the freight from the mines to Pittsburgh, but also with the freight back to Minnesota, the former being an item of approximately $5 per ton of steel and the latter of about $7.90 per ton. This condition being in effect, it was not difficult to appreciate the cause for the tremendous concentration of iron and steel manufacturing in the Pittsburgh district, with all the serious transportation congestions incident thereto, as well as of the difficulty in building up such enterprises in the Northwest.

This situation as it affected Minnesota was brought to the attention of officials of the United States Steel Corporation and others, and, after considerable correspondence and delay, meetings were held at Duluth and elsewhere between executive officers of the Steel Corporation and of several leading steel-making concerns, including the Republic Iron & Steel Co., Jones & Laughlin Steel Co., the Lackawanna Steel Co., Youngstown Sheet & Tube Co., and others on the one hand, and a committee representing the allied commercial and civic bodies of Duluth on the other. These meetings and the information that developed from them resulted ultimately in a willingness on the part of the representatives of the various independent steel-making companies that the chairman of the board of the Steel Corporation should go ahead and make such arrangements as seemed best to him and to the representatives of Minnesota and Duluth.

Influenced by the War

In the meantime, the doctrine of having Pittsburgh as a sole basing point apparently had become more firmly entrenched than ever, by virtue of the attitude of the United States Government because of war conditions; but assaults upon the doctrine had begun by important steel-making centers, and it began to appear probable that the time would come when this price scheme must give way to other principles of economics, and that in time six or eight basing steel price points gradually would establish themselves throughout the country.

Further meetings were held at which the matter was fully discussed, and the conclusion reached that it was inadvisable then to disturb the price fabric of steel, in view of the war and of the probable uncertain future of the Pittsburgh plus idea; but as the result of these sessions a letter was sent the organizations at Duluth on Oct. 16, last, by the chairman of the board of the Steel Corporation, in the course of which he said that the corporation planned, "as soon as present war restrictions shall have passed and business has again become normal, to extend our works (those of the Minnesota Steel Co.) at Morgan Park (Duluth) by the construction and operation of a wire mill, a nail mill, a tin plate mill, and a sheet mill, all up to the standard of our usual developments." This letter closed as follows: "Finally, we believe our attitude and management will convince everyone that we are desirous of acting with the city of Duluth and the State of Minnesota in a spirit of friendship and mutual regard."

Preliminary Work Started

Although the peace treaty is not yet signed, and business has not yet "again become normal," the Steel Corporation has shown the sincerity of its desires by the inauguration of preliminary work, both at Duluth and elsewhere. Among other matters of an important preliminary nature it has secured railway rates on steel products from Duluth to Pacific coast points, that while not yet published, are believed to be favorable to a considerable extension of the territory servable from the head of Lake Superior. Men who should be in a position to know are of the opinion that the territory tributary to a large and balanced steel works at the head of the Lakes will be far greater than has been acknowledged by some, though not at all wider than has been estimated by the civic committees of Duluth. It is probable that when the United States Steel Corporation carries out the plans agreed upon and outlined in the above-mentioned letter, its own conception of tributary territory will reach to and beyond the Pacific coast. The belief is that when in due time several primary basing points are established throughout the United States these will probably be somewhat as follows: One at some Atlantic point, another the overwhelming Pittsburgh district, another the Lake Erie shore, another in the Alabama field at Birmingham, another the Chicago district, a sixth at the head of Lake Superior and near the mines, another in the intermountain region, perhaps at Pueblo or in Utah, and perhaps still another somewhere on the north Pacific coast.

Shipments by Lake

Following is a statement of the amount of iron ore shipped by lake from the Lake Superior region during the year, with totals by ports for the two last years:

Port of Shipment	Season 1917	Season 1918	Total,1918 Per Cent of
Duluth	20,567,419	20,567,288	33.64
Superior	13,978,741	14,068,341	23.00
Two Harbors	9,990,901	8,723,472	14.26
Ashland	7,597,841	7,565,608	12.37
Escanaba	7,156,854	6,774,969	11.17
Marquette	3,202,145	3,457,054	5.66
	62,493,901	61,156,732	100.00

Decrease for 1918, 2.19 per cent for lake shipments only; it is probable that all rail shipments will be somewhat in excess of the preceding year, and that the total of all shipments for 1918 will at least equal those of 1917. Of total lake shipments Minnesota contributed 72.82 per cent.

Founders' Association of Cleveland

The Founders' Association of Cleveland has elected the following officers for 1919: President, Fred B. Whitlock, Interstate Foundry Co.; vice-president, W. F. Swift, City Foundry Co.; treasurer, V. M. Moore, Chisholm-Moore Mfg. Co.; secretary, W. T. Bohn. The executive committee is composed of eight members representing the various branches of the foundry industry. They are as follows: Heavy shops, M. W. Merriman, Madison Foundry Co., and J. B. Francis, Kilby Mfg. Co.; light foundries, Henry Molder, Best Foundry Co., and M. C. Rosenfelt, Grabler Mfg. Co.; malleable foundries, Charles Hotchkiss, National Malleable Castings Co.; steel foundries, Ralph West, West Steel Castings Co.; brass foundries, Henry Selker, Buckeye Brass & Mfg. Co.; aluminum foundries, George Hammink, City Brass Foundry Co.

The association has grown rapidly during the past year and now has a membership of about 50, including about all of the larger Cleveland foundries. It recently moved its offices from the Guardian Building to much larger quarters in the Winton Hotel.

The Onondaga Belting & Supply Co., Inc., Syracuse, N. Y., has filed a voluntary petition in bankruptcy with liabilities stated to be $11,406 and assets $5,345.

Shooting the Shop Orders to Their Targets

Simple Scheme of the Geometric Tool Co. to Rush Instructions to Departments the Instant They Are Required

BY ROBERT I. CLEGG

TO get orders across without delay is the power that puts pressure into production. Planning goes to seed when this fails.

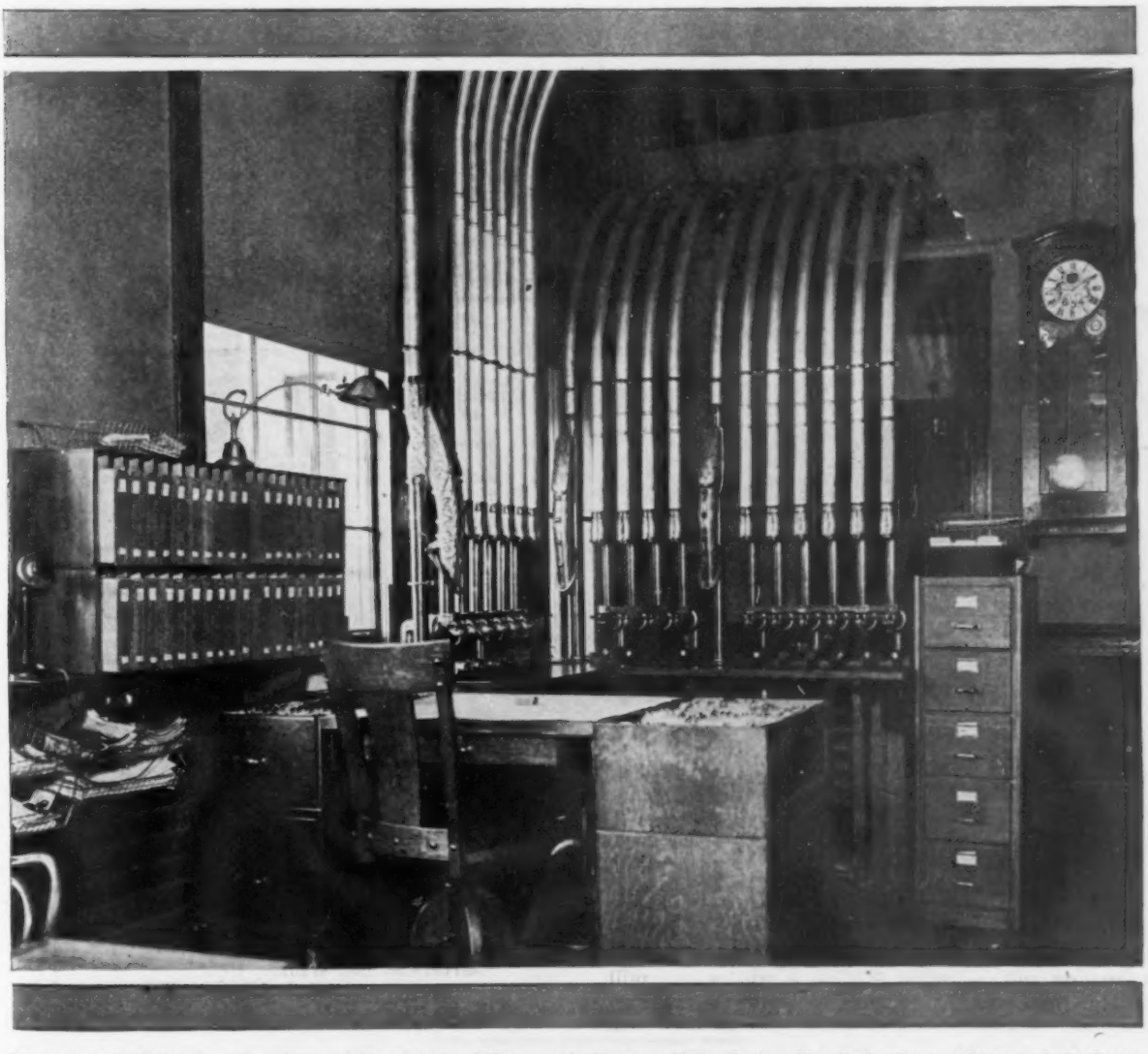
Howard E. Adt, general manager of the Geometric Tool Co.'s plant at New Haven, Conn., had this problem before him for solution. He had his planning department and the organization to go with it all nicely thought out for the routing and producing that gets results, but lacked the necessary connecting link—the link between the mind that plans the work, and the one that works the plan.

Some so-called connecting links don't unite as much as they separate. Orders don't get where they belong just when they should. To send a lingering messenger is often futile. Work waits and the workman's mind is diverted while the boy idles away the time. The workman by his idleness sets a bad example to his associates and is silently or otherwise giving the management absent treatment.

For these reasons the management of the Geometric Tool Co. decided to get the quickest thing possible in the way of a rapid-transit system of distributing information from the office throughout the plant. These arteries of energy are of a kind rare for this general purpose in the industries but not uncommon in purely mercantile and banking establishments.

The tubes of this intercommunicating system are bunched at the office ends in an attractive terminal or central station where 16 sending tubes and three receiving tubes are piped to some 16 local stations. A number of these are shown as they appear in the plant departments. The local tube stations are in every case placed in as central a position in every department as can conveniently be arranged.

Power for this pneumatic communication system is supplied by a 5-hp. electric motor driving a Connersville impeller-type blower running at a speed of 1100 r.p.m. This impeller delivers air through a 5-in. pipe at 1¼ atmospheres pressure. The machinery is all out of the way in the basement of the building. Air pressure is at all times on the tubes that are used for sending from the shop to the office but is only on the tubes from the office to the shop



Central Control Station, Sending and Receiving, of Pneumatic Message Tube System For Order Despatching and the Intercommunication of Shop and Office

at the time that the despatcher there is sending his messages out.

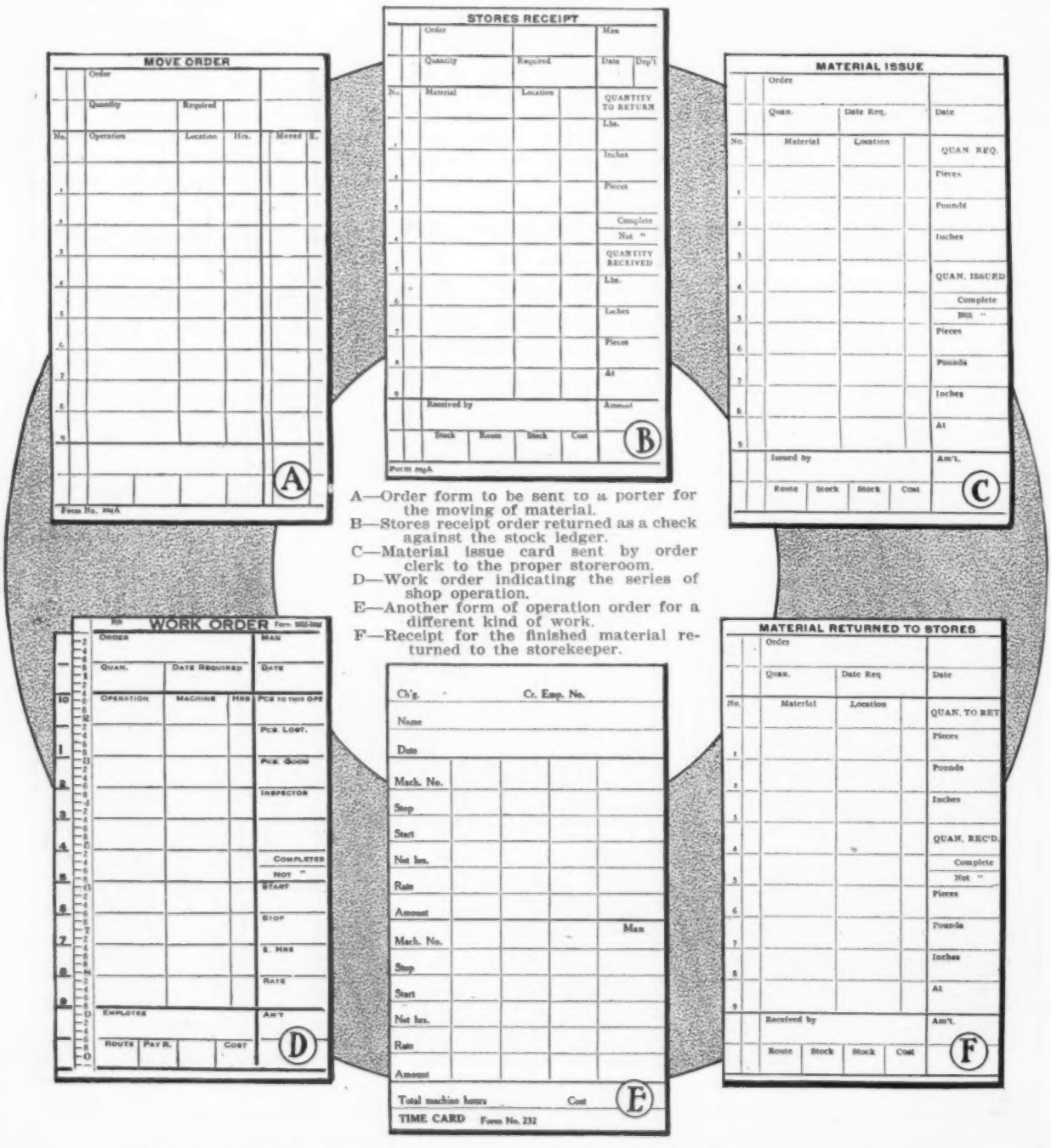
Carriers as well as the method of retaining them in racks ready for instant use, are shown in the illustrations. These carriers are of two sizes. Some are of 1¼ in. diameter by 6 in. long, inside measurements, and others are of the same diameter but 11 in. long. The latter are of sufficient length to carry papers of all kinds, including the blueprints for giving detailed working information to the operatives. These longer carriers have an adjustable direction index making them available for interdepartmental correspondence. The short carriers have but the one designation stamped on them and can only be used between certain specified stations.

An integral part of this plan of intercommunication is the system of directions and reports that guide, determine and follow up shop operations. Getting the order on its way without a halt exactly when it should get into action is only a part, though a very important part, of energizing the shop mechanism of output. Framing up the order is the other half of the job of starting the necessary train of events. The small but comprehensive and effective forms that are used are reproduced.

A is the Material issue form, filled out at the desk of the order clerk after the proper routing of the work has been done by the planning department. When so prepared and ready for starting action in the shop this card is shot on its way through the appropriate tube to the proper storeroom clerk.

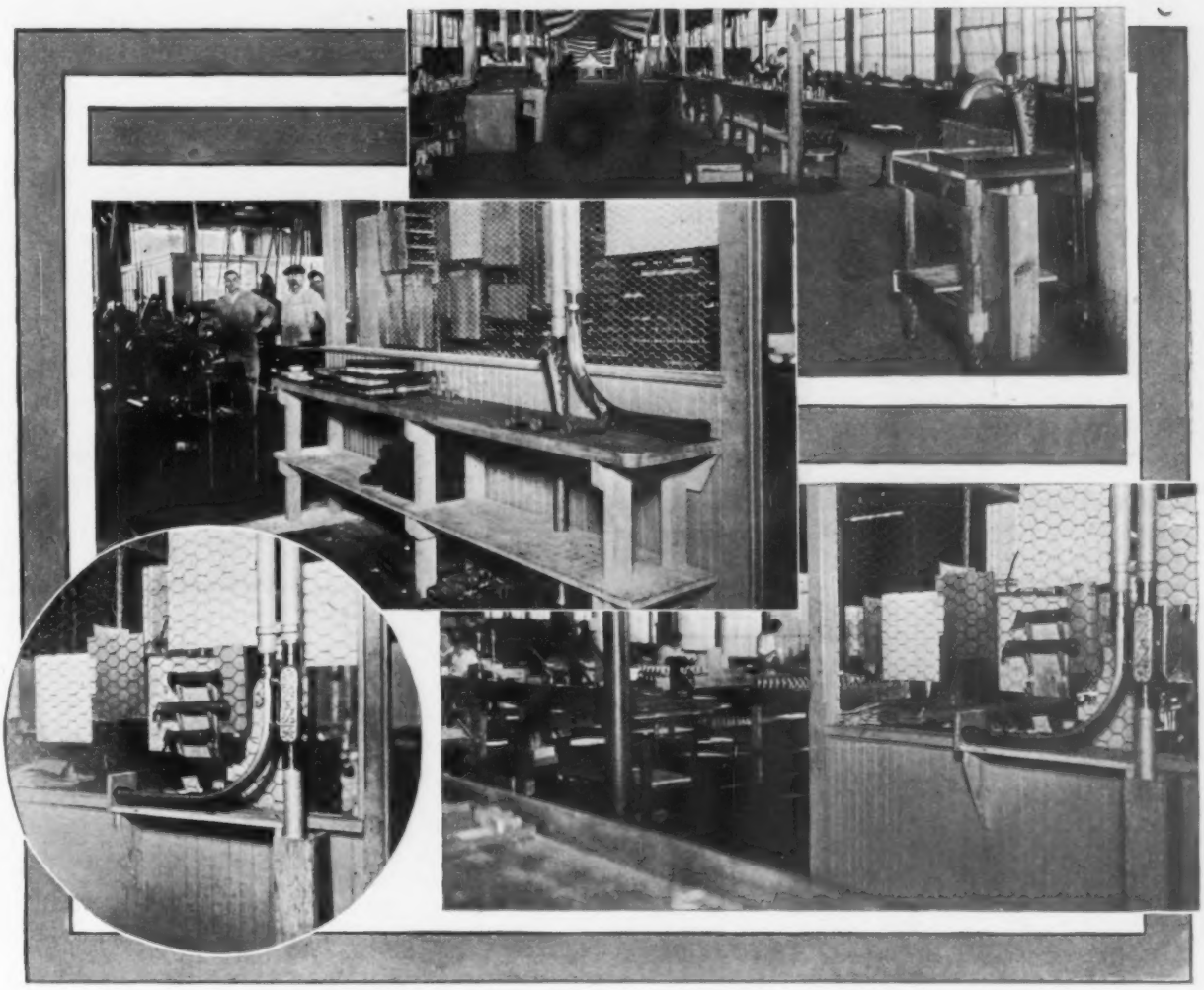
B is the move order form carrying the instructions to a porter after the suitable material has been selected for him to take to its designated place in the plant.

C and *D* are work order forms according to the kinds of work and control the performance of the work at designated stations. These work orders are sent through the tubes to the proper departmental stations in the plant in strict accordance with the master instructions that have been outlined by the planning department. Material is then forwarded to the next predetermined station by the porters,



A—Order form to be sent to a porter for the moving of material.
B—Stores receipt order returned as a check against the stock ledger.
C—Material issue card sent by order clerk to the proper storeroom.
D—Work order indicating the series of shop operation.
E—Another form of operation order for a different kind of work.
F—Receipt for the finished material returned to the storekeeper.

Forms Used for Handling Orders Through the Pneumatic Tube System. These forms are 3 x 5 in.



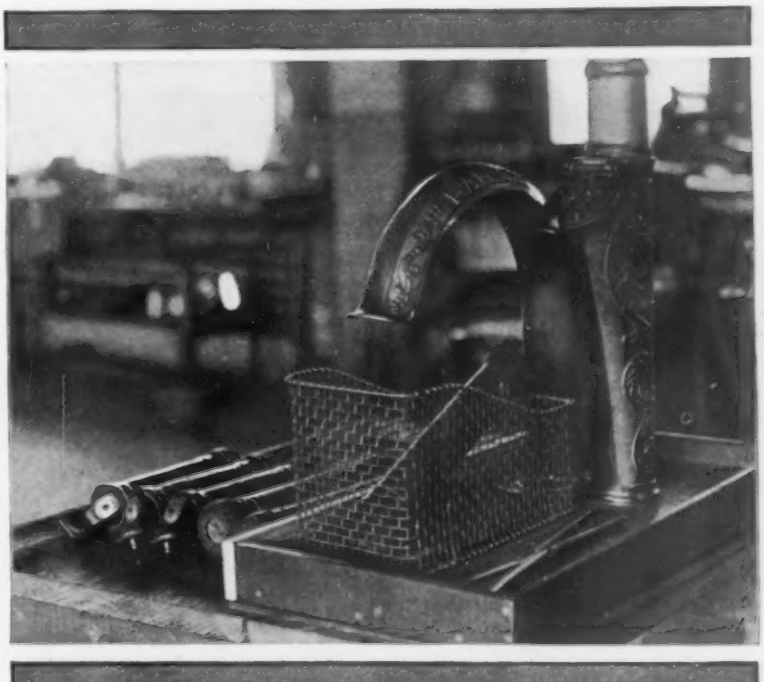
Specimens of the Stations in the Plant That Are Served by the Tube Intercommunicating System

and order cards are issued as before through the tubes for this purpose.

E is a receipt form to be used as follows: When any part is completed and inspected a porter takes it to the storehouse after having received his move order form properly filled out and forwarded to him through the tubes system. Then this form *E*, of material that is returned to stores, is sent from the order department to the storeroom clerk for delivering to the porter as his receipt for the part turned in.

F is the stores receipt form. When the material is sorted and placed in its proper place in the store, this receipt is checked and sent through the tubes to the order department, where it is listed and checked against the stock ledger.

Each of the workmen gets his work order laying out the job, and before he finishes that series of operations, he is in possession of the material for the next piece of work. He returns his work order, sending it from the nearest station in his department, to the central office desk at the order department. The despatch clerk there immediately shoots at him his next work order, having already delivered the material for its execution at a handy location in the department to which he has been assigned.



A Representative Local Receiving Station in One of the Plant Departments

In this way the correct order card gets instantly where it belongs, there are no mistakes by delays, and, best of all, the workman is served as he likes to be, promptly and completely. No errand boy balks the business or muddles up any good intentions.

Lukens Plate Mill Is Largest in the World

After a Long Race of Leaders in Platemaking the Lukens Steel Co. Has with Many Engineering Exploits Regained Supremacy

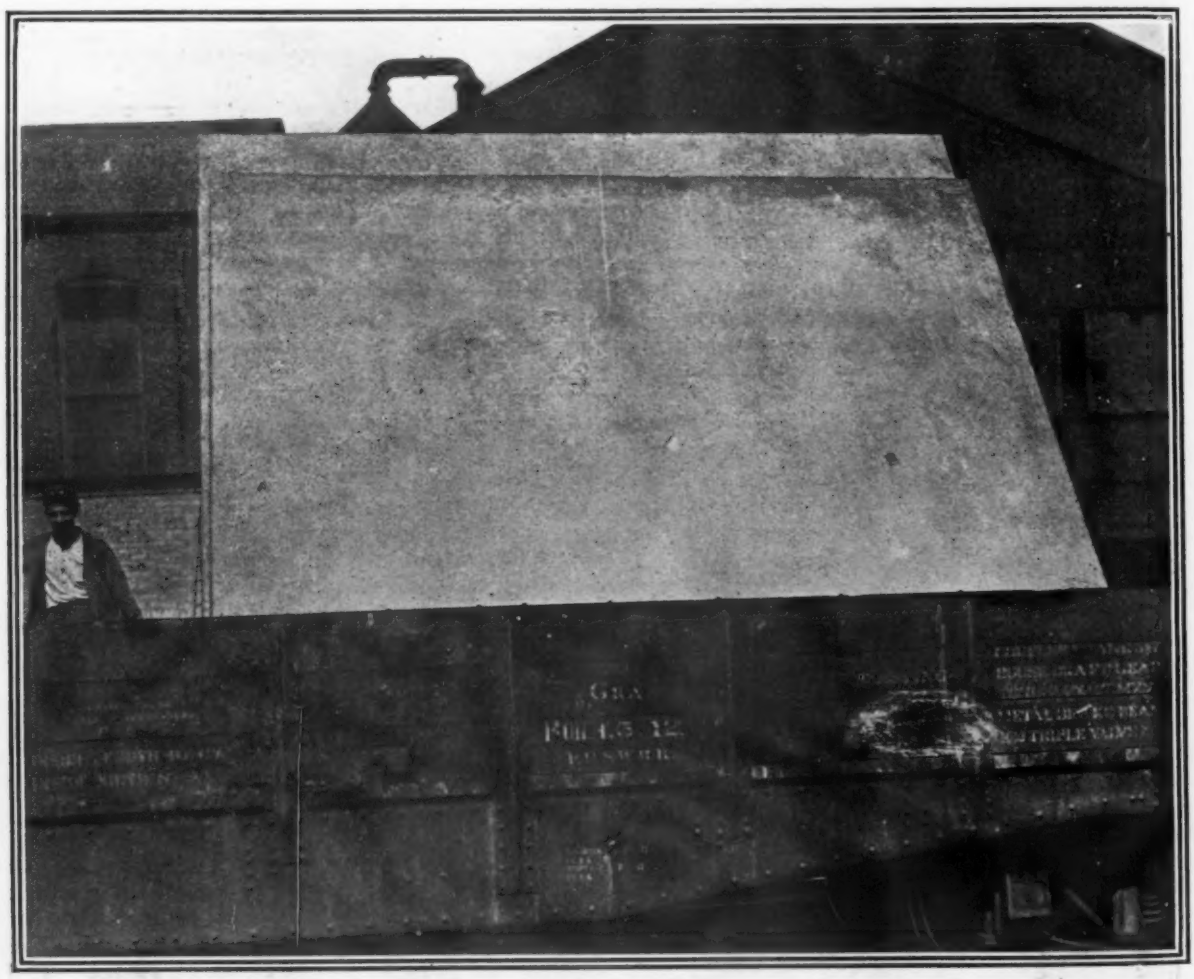
THE Lukens Steel Co., Coatesville, Pa., for the fourth time in its history has the largest plate mill in the United States in operation at its plant. In 1890 the company started up a 120-in. sheared plate mill, which was then the largest of its kind. Subsequently this mill was surpassed in size by one installed by another company. The Lukens mill was then rebuilt to 134-in. size, which regained the lead. Then came a new 136-in. mill at another plant; but in 1903 the present three-high 140-in. unit at Coatesville was put in service. This lead was taken away when two 152-in. three-high mills were elsewhere installed. Now the Lukens company comes forward and is operating a new 204-in. mill. It is a four-high reversing type, and 204 in. (17 ft.) is the width of rolls. It is capable of rolling plates up to 192 in. width and circles a few inches wider. It exceeds by a wide margin the 178-in. mill of the Witkowitz Works in Austria and the 168-in. mills which are the present limit of the two-high plate stands in the British Isles.

It was at the Lukens plant that the first boiler plate in America was made. This was about 1820, the largest plate at the time being about 44 in. in width. The finished product at that time was hauled by team to Philadelphia, distant 40 miles, and fuel was hauled a distance of 42 miles. The first boiler plate in America, rolled at the plant of the Lukens Steel Co., was under the direction of Dr. Charles Lukens, grandfather of Abram Francis Huston, president, and Charles Lukens Huston, vice-president of the company.

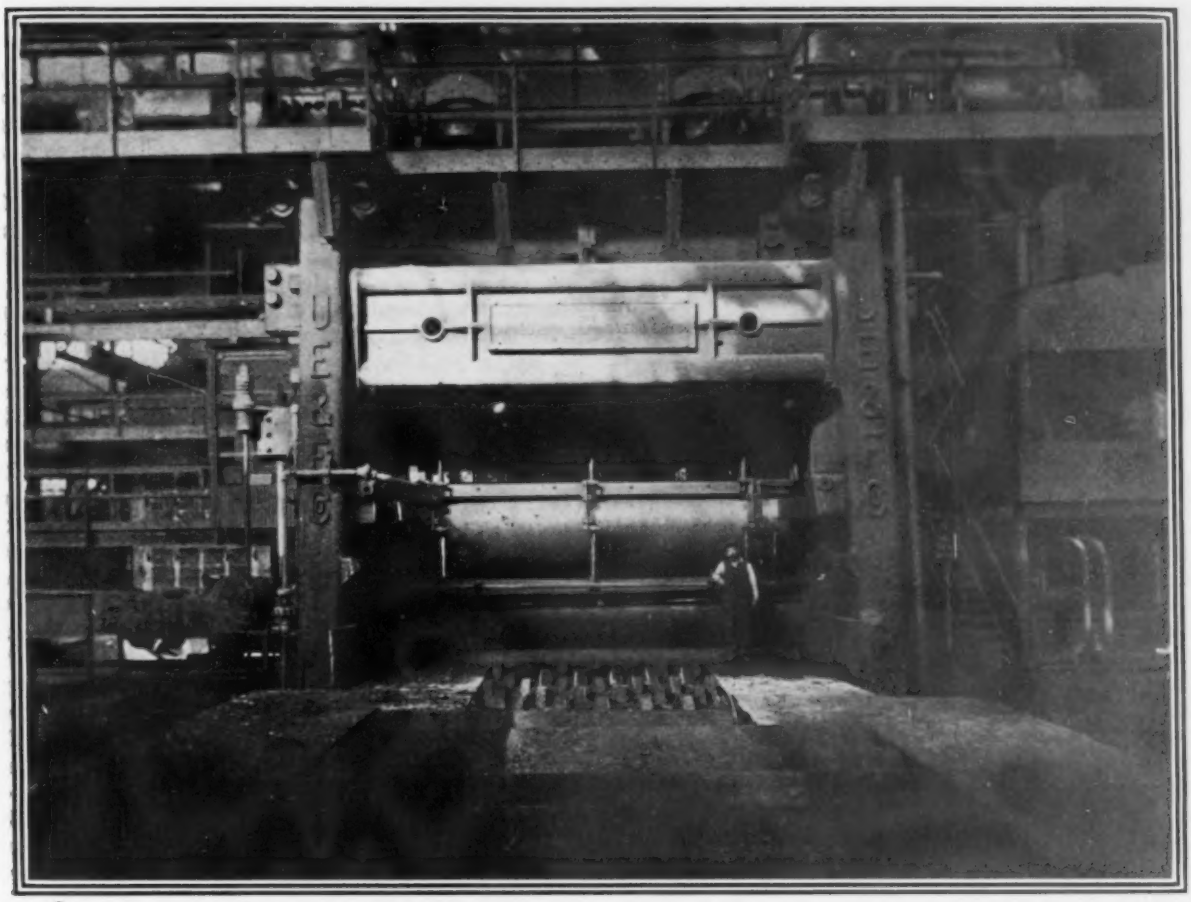
The new mill has just started regularly as an independent unit. Until now the shortage of men has prevented its being run over a few hours a week, but in operation it proves to be the stiffest mill they have ever built; even on extreme widths the variation in gage at center is very little. A novel plan of handling and weighing the plates after shearing, designed by C. L. Huston, has been installed. Further devices are planed to eliminate almost all hand labor in shearing and to do more accurate shearing than is general.

This mill was built to make large plates for locomotives, ships and marine boilers. The Lukens company can now flange heads in one piece for 15-ft. boilers. Flanging boiler heads of these sizes in one piece, it is believed, has never been done in this country. When flanged in one piece the head is heated and is then flanged at one operation by rolling, whereas if heated a number of times and flanged all the way around, as formerly, internal strains were set up in the metal.

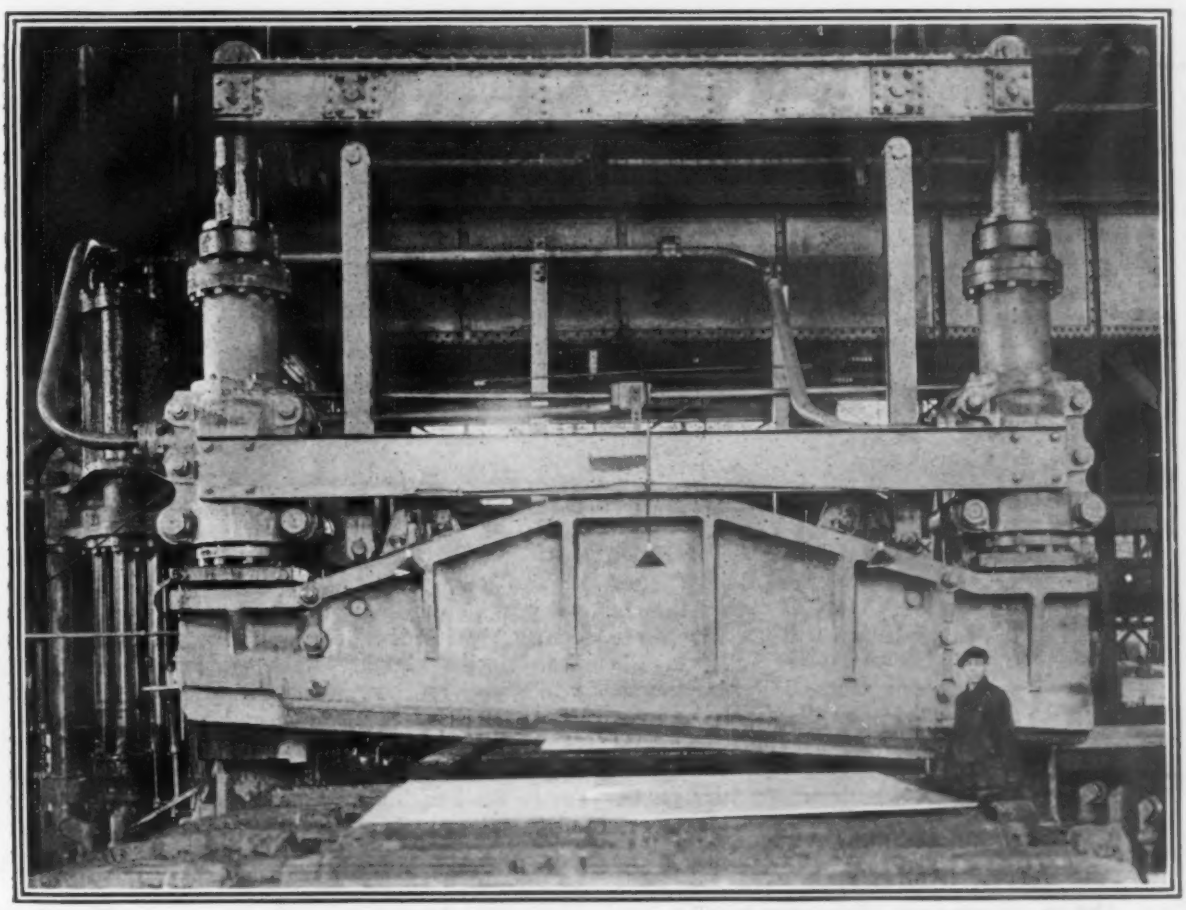
The decision of the Lukens Steel Co. to build the



Two plates on the same car. The larger is 180 x 180 x ¾ in., and locomotive firebox steel. This plate weighed 7260 lb. The smaller plate is 180 x 165 x ¾ in., locomotive firebox steel, and weighed 6880 lb. These plates are for the largest locomotive ever built in this country and were furnished the Pennsylvania Railroad Co., Altoona, Pa.



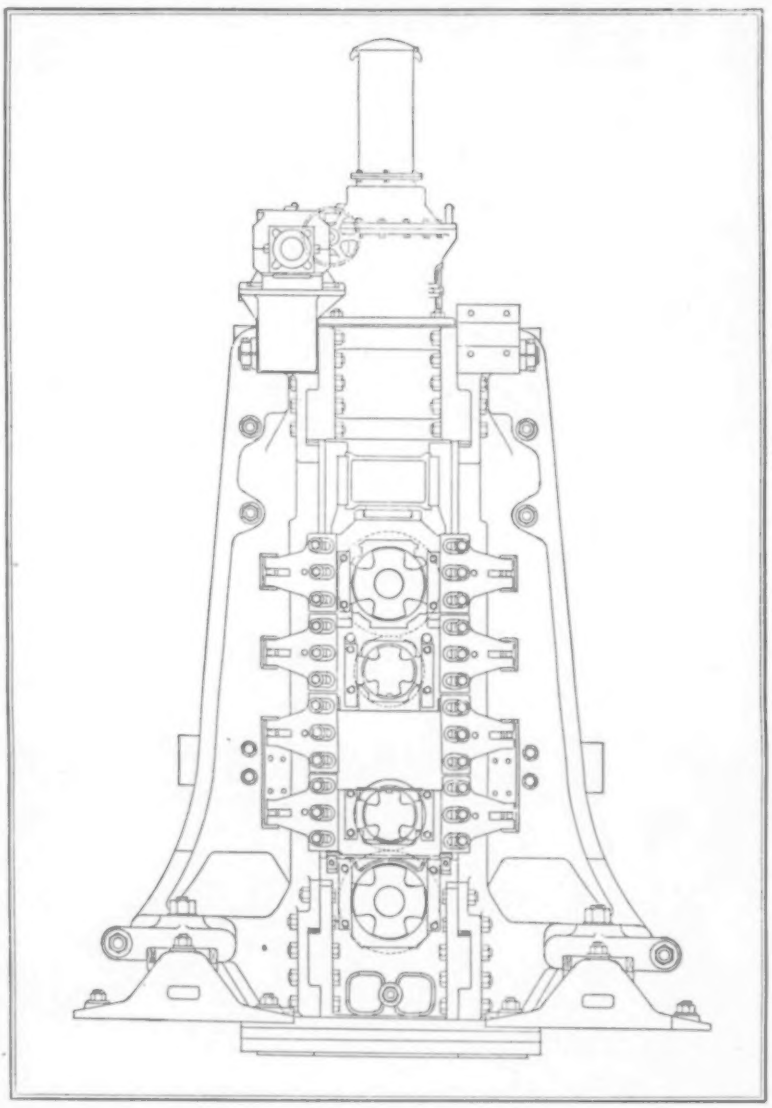
The two working rolls of this four high reversing mill are of cast iron 34 in. diameter with 204 in. chilled face, each weighing 30 tons. The backing-up rolls are the large rolls and are of cast steel, 50 in. in diameter, weighing about 60 tons each. The man is standing on the top of the bottom pair of rolls; just at his shoulder is seen the bottom or small roll (34 in. diameter) of the upper pair of rolls, and just above this is the large roll (50 in. diameter) so that a considerable portion of the mill is below the man, and cannot be seen in this photograph



The knife of the hydraulic shears is 215 in. long, and can cut plates 2 in. thick

largest plate mill in the United States came about in an interesting way. As frequently is the case, obstacles encountered in one direction were responsible for the way in which the matter finally was determined. Because of the growing demands from large plate users for greater widths, the company took into consideration the building of a 180-in. three-high mill.

This mill as first planned would have been larger than any even now in the United States or Europe. As to chilled rolls of the size desired there was no manufacturer to undertake the contract. The 50-in. diameter rolls required for a mill of the three-high type settled upon were far greater than American rollmakers had attempted, and difficulties of manufacture forbade their bidding for this business. It was then that Charles L. Huston proposed a four-high reversing mill to maintain the fine chilled roll finish upon the plates and admit of a still larger size than 180-in. The designing has been carried out by the collaboration of the United Engineering & Foundry Co. and Paul C. Haldeman, master mechanic of the Lukens company.



Side View of the Mill. This shows the finishing rolls and large backing rolls

The new mill is built on the two-high reversing plate stand commonly used in the British Isles, with a modification, viz.: that the two finishing rolls are backed by two large supporting rolls. The purpose of these latter rolls is to stiffen the mill and to give it the added strength necessary to prevent springing of the rolls when on wide and thin plates, thus to insure uniform thickness. This arrangement permits rolls of smaller diameter and overcomes the difficulties of obtaining chilled rolls of the size required in a three-high mill of this extreme width. There are two 34-in. diameter by 204-in. working face rolls of chilled iron, with 27-in. necks, weighing about 30 tons each, and two 50-in. diameter backing rolls of cast steel, 36-in. necks, weighing about 60 tons each.

The housings are steel, built up in four parts. They consist of two side pieces, a top bridge piece containing the screw box, and a bottom bridge piece having the seat for the bottom rolls. This construction is necessitated by the size of the housings precluding their being cast in one piece, since their machining and transportation would then be impossible. Each housing, built up, weighs over 400,000 lb. The mill stands about 40 ft. from the top of the screw cover to the bottom of the shoes, and its overall dimensions are over 42 ft. The housing shoes are spread 16 ft. 9 in. between centers and have extra large bearings.

The foundation is concrete built on solid rock. The strong and simple design is made possible by the cylinder arrangement. The two top roll supporting cylinders are carried on the spreader between the housings, and they can be used as operating cylinders for changing rolls. The screw-down rig is of worm and worm-wheel design and driven by two 150-hp. motors, one on each housing. These motors act as a roll release in case of a stall.

The pinions are cast steel with double helical cut teeth, 42-in. pitch diameter by 60-in. face. These pinions are connected to the working rolls by spindles 20 ft. long. The bottom spindle is of the usual design, while the top or vibrating spindle has special universal couplings. To insure the driving of the bottom backing-up roll, it was deemed necessary by C. L. Huston that this should have some suitable power connection between the pinions and the mill, as it was feared there would not be sufficient friction between the bottom working roll and the backing-up roll to drive the latter at all times.

This power connection is a friction clutch drive to the bottom roll, and allows of slippage between the two bottom rolls, thus preventing breakage. The friction is gear driven on an extension to the neck of the bottom pinion driving into a third spindle, which connects with the bottom backing-up roll through the friction clutch, located midway between the pinion and roll housings. This friction is in duplicate and the device can be quickly replaced should that become necessary. The large backing-up rolls are turned in the mill, turning rests being provided for in the housing. These rests are left in position all the time and only require adjusting to the roll for use. The 34-in. chill rolls are removed and ground in a special machine built by the Norton Grinding Co., Worcester, Mass., and is the largest grinder ever constructed for this class of work.

The changing of the 34-in. diameter rolls has been incorporated in the mill design. The rolls are lifted by the top roll balancing cylinders and placed on a special buggy which runs in on the middle roll rest bars. This allows the roll to be pulled out of the housing window where it is picked up by the crane. The 50-in. diameter backing-up rolls are removable in the same manner.

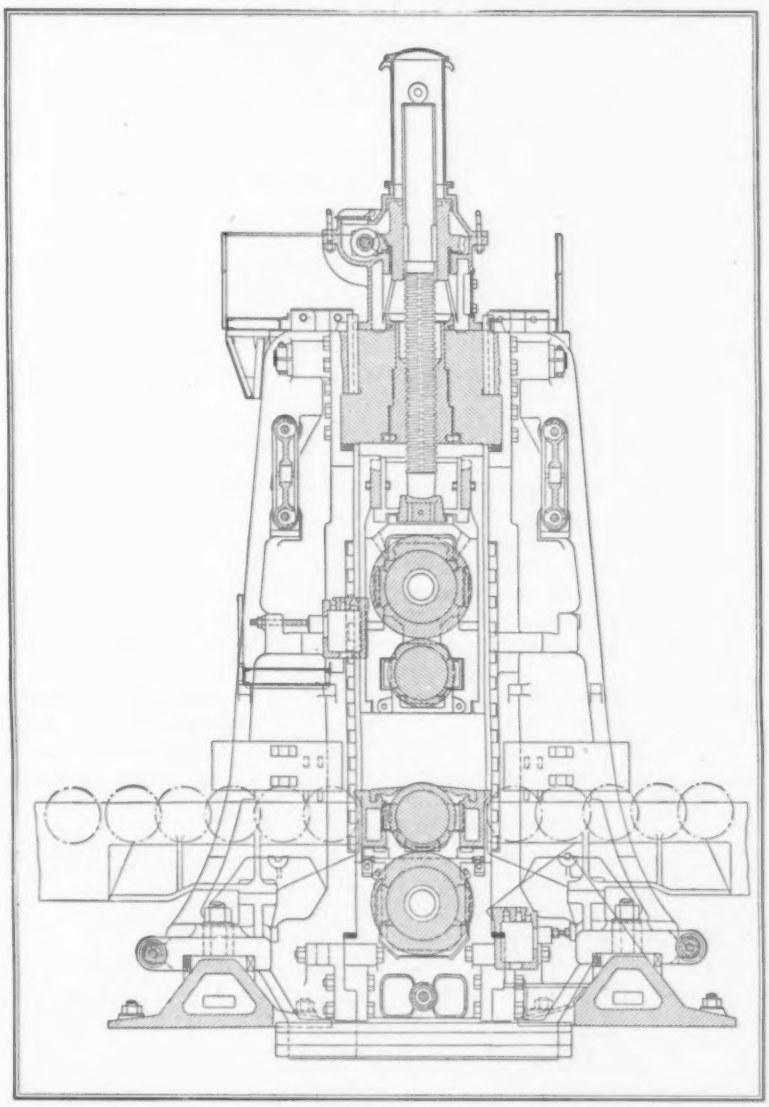
The bottom pinion is connected to the engine jack shaft by a finely machined leading spindle of the universal type. This connection insures a minimum of back lash. The leading spindle can be quickly removed and a slow-motion turning rig slid into place for dressing the 50-in. backing-up rolls.

The mill is driven by a 46 x 70 x 60-in. twin-tandem compound-condensing engine, fitted with a jack shaft and a gear ratio of one to two, capable of giving an enormous torque. The engine was designed and built by the Mesta Machine Co., Pittsburgh. Steam for the engine is obtained from Babcock & Wilcox waste heat boilers located on open-hearth and reheating furnaces; the boilers are run at 160 lb. pressure and 100 deg. superheat.

The mill is fully equipped with tables to do away with hand labor wherever possible. The ingots are received from the furnaces by a hydraulically-operated ingot tilter from which they go to the approach table, and from there to the mill tables. The approach table is about 40 ft. long, and the mill tables of about equal length. Each mill table has 10 cylindrical rollers and five disk rollers. The rollers are driven by cut gearing, and the bearings and gearings are flood lubricated by an oil pumping system installed in duplicate. The tables have mechanical appliances for handling large plates so that it is not necessary for them to be touched by hand power.

The plates, after being rolled, pass over the runout tables, 65 ft. long, to the straightening rolls. These rolls were furnished by the Hilles & Jones Co., Wilmington, Del., after Mr. Huston's special design, and are motor-driven. After leaving the straightening rolls, the plates pass to the cooling tables. These are mill transfer chain roller tables, arranged so they can be operated in triplicate. Either one, two or three tables are used, depending on the length of the plate transferred. If the plate is over 35 ft. long, two tables are needed; if over 70 ft. long, three are used. An inspection tilt-up device for turning up the plates so that the bottom side may be inspected is in this table. It is operated by hydraulic cylinders. This rigging is of the necessary size and strength to accommodate plates 204 in. wide.

After inspection, the plates go to the shear runout table through the cut-off shear, which is hydraulically operated and has a 210-in. gap. The cut-off shear is in the shearing building, as is also the side shear, of the same size, and the necessary scrap shears. Between these shears are tables specially designed by Mr. Huston for the handling and turning of wide and long plates. These take the place of usual caster roller arrangement and avoid hand labor. Another set of transfer chains carry the plates sidewise to the shipping building where they are weighed and loaded.



Sectional drawing showing the screw-down mechanism

The heating building contains eight gas-fired furnaces; some of these contain three holes 7 x 9 ft., while the others, four holes, are 5 x 9 ft. The furnace building is served by two 30-ton cranes. The main mill building is 70 x 215 ft. and contains one 75-ton repair crane. The cooling building is 100 x 240 ft.; the shearing building 80 x 240 ft., and the shipping house 90 x 505 ft. Two smaller buildings are on either side of the main mill.

The mill has a slack-up of 40 in. and it is possible to roll ingots up to 60,000 lb. These large plates are rolled direct from the ingots, but as this has been the practice in the Lukens plant, no serious trouble is experienced. When the mill is operating full, it is estimated to have a rolling capacity of 4000 to 5000 tons per week.

To supply the increased metal to operate the new mill an additional steel plant having six basic open-hearth furnaces of 100 tons each has just been finished. There is room for two more furnaces, work on which has been started. This group of eight furnaces presents a distinct open-hearth plant, and with these eight new furnaces the Lukens plant will have 23 basic furnaces and one acid furnace. The estimated annual capacity will be about 500,000 tons of finished plates.

The Status of the Electric Steel Industry

United States Still Leads in Output with 287 Furnaces—Progress Since 1910—Furnaces in World's Industry Probably Over 815

BY EDWIN F. CONE

The electric steel industry of the United States did not expand in 1918 to the remarkable extent which it did in 1917, so far at least as number of new furnace installations is concerned. The growth however was of decided and significant proportions. While data as to developments in Europe are not obtainable, there is no doubt but that the United States still maintains by an increased margin, both in furnace installations and in output, its leadership, assumed for the first time Jan. 1, 1916.

On Jan. 1, 1918, according to THE IRON AGE'S annual review of the electric steel industry published in the issue of Jan. 3, 1918, the United States was credited with 233 electric furnaces of all types, with 36 in Canada. On Jan. 1, this year, this total has been increased to 330 in this country and 43 in Canada. Only six and one-half years ago, or on July 1, 1913, there were only 19 such furnaces in this country and three in Canada. The total in the world on Jan. 1, 1918, was estimated at 733; this has been increased to over 815 and perhaps more. Six and one-half years ago this total was only 140.

A review of this industry was inaugurated by THE IRON AGE, the first data appearing in the issue of July 1, 1913. The first estimate of this kind appeared in *Stahl und Eisen*, which THE IRON AGE amplified for its issue of April 14, 1910. This review has appeared annually in each Annual Review Number beginning in January, 1915.

The review which follows gives complete data as to every type of furnace concerning which it has been possible to obtain information. Separate tables of many of the types are given which show the present installations and the product to date, both in the United States and Canada. The data is particularly accurate as to the United States and nearly complete as to Canada. For the first time in several years the table of Heroult furnaces gives all existing furnaces or contracts to date. Data as to the world were impossible to compile, and the table of a year ago is repeated as a matter of information. It is hoped to amplify this a year from now.

The United States and Canada in 1918

The increase in the number of furnaces in the United States in 1918 has been 54 against 97 in 1917 and 63 in 1916. The total is now 287 against 233 on Jan. 1, 1918, and 136 on Jan. 1, 1917. The apparent net increase of 54 in the last year is less than the actual, due to cancellation of contracts or the passing out of commission of some installations. The growth of the industry is appreciated when it is recalled that there were only 19 furnaces of all types in the United States on July 1, 1913.

In Canada the expansion has been a net increase of 7 furnaces, or from 36 on Jan. 1, 1918, to 43 on Jan. 1, 1919. The actual new installations were more numerous. On Jan. 1, 1917, there were only 19 furnaces in Canada and only 3 on July 1, 1913.

The increase in the two countries has been 61 furnaces in 1918, or from 269 on Jan. 1, 1918, to 330 on Jan. 1, 1919.

The feature of the development in 1917 in both the United States and Canada was the large number of

Table of Snyder Electric Steel Furnaces Operating or Contracted for in the United States and Canada, Jan. 1, 1919, as Sold by the Industrial Electric Furnace Co., Chicago

Company	Location	Furnaces
Crucible Steel Casting Co.	Milwaukee, Wis.	1
Otis Elevator Co.	Buffalo, N. Y.	2
Gerlinger Steel Casting Co.	Milwaukee, Wis.	2
S. Fair & Son	Saginaw, Mich.	1
Niagara Electric Steel Corporation	N. Tonawanda, N. Y.	2
Halcomb Steel Co.	Syracuse, N. Y.	1
Sivyer Steel Casting Co.	Milwaukee, Wis.	1
Electric Steel Co.	Chicago, Ill.	2
Frog Switch & Mfg. Co.	Carlisle, Penna.	1
American Well & Prospecting Co.	Corsicana, Tex.	1
Monroe Steel Casting Co.	Monroe, Mich.	1
Pelton Steel Co	Milwaukee, Wis.	2
Minneapolis Electric Steel Casting Co.	Minneapolis, Minn.	1
Western Crucible Steel Co.	Minneapolis, Minn.	2
Dayton Steel Foundry Co.	Dayton, Ohio	1
New London Ship & Eng. Co.	Groton, Conn.	1
Stearns-Rogers Mfg. Co.	Denver, Col.	1
Fairbanks Steam Shovel Co.	Marion, Ohio	2
West Steel Casting Co.	Cleveland, Ohio	1
Beaumont Iron Works	Beaumont, Tex.	1
Joyce-Cridland Co.	Dayton, Ohio	2
Henderson Iron Works & Supply Co.	Shreveport, La.	2
United Alloy Steel Corp.	Canton, Ohio	1
Standard Steel Casting Co.	Cleveland, Ohio	1
Standard Steel Casting Co.	Clearing, Ill.	2
Chile Exploration Co.	New York, N. Y.	1
Zimmerman Steel Co.	Bettendorf, Iowa	1
Atlantic Foundry Co.	Akron, Ohio	1
Buckeye Traction Ditcher Co.	Findlay, Ohio	1
Hubbard Steel Foundry Co.	East Chicago, Ind.	1
Western Steel Car & Fdy. Co.	Hegewisch, Ill.	2
Oil Well Supply Co.	Oil City, Pa.	1
Fluid Compressed Steel Co.	Keokuk, Iowa	1
Denver Rock Drill Mfg. Co.	Denver, Col.	1
Thos. Davidson Mfg. Co.	Montreal, Can.	1
Manitoba Steel Fdrys., Ltd.	Winnipeg, Can.	1
Canadian Brakeshoe Co., Ltd.	Sherbrooke, Can.	1

Total in the United States, 45; in Canada, 3.

Besides these, the Haynes Stellite Co., Kokomo, Ind., operates 3 Snyder furnaces producing stellite; the Chicago Bearing Metal Co., Chicago, operates 2 furnaces producing railroad brass castings, and the Bayonne Castings Co., Bayonne, N. J., 1 furnace.

Besides these, Burn & Co., Calcutta, India, is operating 1 furnace and Mitsui & Co., Japan, are credited with 2 furnaces.

The Industrial Electric Furnace Co. states that all the 48 furnaces in the United States and Canada are making steel castings or ingots.

Table of Rennerfelt Electric Steel Furnaces Operating or Contracted for in the United States, Jan. 1, 1919, as Sold by Hamilton & Hansell, New York

Company and Location	Capacity, Lb.	Product
American Foundry & Machine Co., Salt Lake City, Utah	6600	Castings
Skagit Steel & Iron Works, Sedro Woolley, Wash.	2200	Castings
Samson Sieve Grip Tractor Co., Stockton, Cal.	2000	Castings
The Parsons Co., Newton, Iowa	2200	Castings
Maynard Steel Castings Co., Milwaukee, Wis.	2000	Castings
Pacific Foundry Co., San Francisco, Cal.	750	Pig iron
Chile Exploration Co., New York City	1000	Special iron
Oklahoma Iron Works, Tulsa, Okla.	2200	Castings
The Central Steel Co., Massillon, Ohio	2200	Melting ferro-manganese
Moreland Motor Truck Co., Los Angeles, Cal.	750	Castings
American Metallurgical Corporation, Conshohocken, Pa.	2000	Castings
Consumers' Steel Corporation, Chicago, Ill.	2200	Tool steel
Haynes Stellite Co., Kokomo, Ind.	100	Alloy steel

Total in the United States, 13.

Besides these there are 8 Rennerfelt furnaces operating in the United States in the non-ferrous industry. There are also 2 furnaces in Japan making special alloy steels 2 in Brazil making steel ingots, and 1 in Chile making iron and steel castings.

Table of Grönwall-Dixon Electric Steel Furnaces Operating or Contracted for in the United States and Canada on Jan. 1, 1919, as Sold by the John A. Crowley Co., New York

Company and Location	Size, Tons	No. of Furnaces	Product
The John A. Crowley Co., Detroit, Mich.	10	1	Ingots
The John A. Crowley Co., Detroit, Mich.	5	1	Ingots
Old Dominion Iron & Nail Works Co., Richmond, Va.	5	1	Ingots
Norfolk & Western Railroad, Roanoke, Va.	3	1	Castings
United States Electric Steel Co., Connellsville, Pa.	10	1	Ingots
Jessop Steel Co., Washington, Pa.	3	1	Ingots
Calumet & Hecla Mining Co., Calumet, Mich.	3	1	Castings
Huntington Steel Foundry Co., Huntington, Ind.	3	1	Castings
Hartford Electric Steel Corp., Rocky Hill, Conn.	3	1	Castings
Glover Machine Works, Marietta, Ga.	1	1	Castings
Ford Motor Co., Detroit, Mich.	¼	1	Castings
Cleveland Brass Mfg. Co., Cleveland	¼	1	Alloy steel castings
Bowmanville Foundry Co., Bowmanville, Ont.	¼	1	Castings

Total in the United States, 12; in Canada, 1.

Table of Heroult Electric Steel Furnaces, Operating or Contracted for, as Licensed by United States Steel Corporation, in the United States and Canada, Jan. 1, 1919

Company and Location	No. of Furnaces	Size, Tons	Product
Alaska Treadwell Gold Mining Co., Treadwell, Alaska	1	2	Castings
American Manganese Steel Co., Oakland, Cal.	1	3	Castings
American Steel Foundries, Indiana Harbor, Ind.	1	6	Castings
Anniston Steel Co., Anniston, Ala.	5	6	Castings and pig iron
Armstrong, Whitworth of Canada, Ltd., Longueuil, Quebec	1	3	Ingots
Armstrong, Whitworth of Canada, Ltd., Longueuil, Quebec	3	6	Ingots
Atlas Crucible Steel Co., Dunkirk, N. Y.	1	3	Ingots
Atlas Crucible Steel Co., Dunkirk, N. Y.	1	6	Ingots
Bayonne Steel Casting Co., Bayonne, N. J.	1	3	Castings
Belle City Malleable Iron Co., Racine, Wis.	1	3	Castings
Bethlehem Steel Co., Bethlehem, Pa.	1	3	Castings
Bethlehem Steel Co., Bethlehem, Pa.	1	6	Ingots
Braeburn Steel Co., Braeburn, Pa.	2	6	Ingots
British Forgings, Ltd., Toronto, Canada	10	6	Ingots
Buchanan Electric Steel Co., Buchanan, Mich.	1	2	Castings
Buchanan Electric Steel Co., Buchanan, Mich.	1	3	Castings
Buckeye Steel Casting Co., Columbus, Ohio	1	6	Castings
Carbon Steel Co., Pittsburgh	1	6	Ingots
Carnegie Steel Co., Duquesne, Pa.	1	25	Ingots
Carpenter Steel Co., Reading, Pa.	4	6	Ingots
Connecticut Electric Steel Co., Inc., Hartford, Conn.	2	2	Castings
Crane Co., Chicago, Ill.	1	6	Castings
Crucible Steel Casting Co., Cleveland, Ohio	1	1	Castings
Crucible Steel Co. of Amer., Atha Works, Harrison, N. J.	1	3	Ingots
Crucible Steel Co. of Amer., Atha Works, Harrison, N. J.	3	6	Ingots
Crucible Steel Co. of Amer., Park Works, Pittsburgh.	2	6	Ingots
Crucible Stl. Co. of Amer., Sanderson Wks., Syracuse, N. Y.	2	3	Ingots
Damascus Crucible Steel Casting Co., New Brighton, Pa.	1	2	Castings
Henry Disston & Sons, Inc., Philadelphia	1	3	Ingots
Dominion Foundries & Steel, Ltd., Hamilton, Canada	2	6	Castings
Driscoll-Reese Steel Co., Hamburg, Pa.	1	1	Castings
Driver-Harris Co., Harrison, N. J.	1	2	Castings
Electric Steel & Forge Co., Cleveland, Ohio	1	3	Ingots
Electric Steel & Forge Co., Cleveland, Ohio	1	6	Ingots
Electric Steel Co. of Indiana, Indianapolis, Ind.	1	3	Castings
Electric Steel & Metals Co., Ltd., Welland, Canada	2	6	Ingots
Firth-Sterling Steel Co., McKeesport, Pa.	2	3	Ingots
Fulton Steel Corporation, Fulton, N. Y.	1	1	Ingots
Fulton Steel Corporation, Fulton, N. Y.	1	6	Ingots
General Electric Co., Schenectady, N. Y.	1	5	Castings
General Electric Co., Schenectady, N. Y.	2	2	Castings
General Electric Co., Schenectady, N. Y.	1	1	Ingots
General Electric Co., West Lynn, Mass.	1	6	Castings
General Electric Co., Erie, Pa.	1	6	Castings
General Electric Co., Pittsfield, Mass.	1	1	Experimental products
General Motors Co., Stockton, Cal.	1	6	Castings
General Motors Co., Pontiac, Mich.	1	6	Castings
Halcomb Steel Co., Syracuse, N. Y.	1	4	Ingots
Halcomb Steel Co., Syracuse, N. Y.	3	6	Ingots
Harrow Spring Co., Kalamazoo, Mich.	1	6	Ingots
Heppenstall Forge & Knife Co., Pittsburgh, Pa.	2	6	Ingots
Hess Steel Corporation, Baltimore, Md.	6	6	Ingots
Hussey-Binss Steel Co., Charleroi, Pa.	1	6	Ingots
Illinois Steel Co., South Chicago, Ill.	2	15	Ingots
Illinois Steel Co., South Chicago, Ill.	3	25	Ingots
Illinois Steel Co., Joliet, Ill.	1	4	Molten ferro-manganese
Latrobe Electric Steel Co., Latrobe, Pa.	1	3	Ingots
Latrobe Electric Steel Co., Latrobe, Pa.	2	6	Ingots
Lebanon Steel Foundry, Lebanon, Pa.	2	2	Castings
Lemoyne Steel Co., Monongahela, Pa.	1	2	Ingots
Llewellyn Iron Works, Los Angeles, Cal.	1	3	Castings
Lunkenheimer Co., Cincinnati, Ohio	1	1	Castings
Michigan Steel Casting Co., Detroit, Mich.	1	6	Castings
Michigan Steel Casting Co., Detroit, Mich.	2	3	Castings
Midvale Steel & Ordnance Co., Philadelphia,	2	10	Ingots
Millbury Steel Foundry Co., Millbury, Mass.	1	2	Castings
Milwaukee Steel Foundry Co., Milwaukee, Wis.	1	3	Castings
Monarch Foundry Co., Stockton, Cal.	1	1	Castings
National Malleable Casting Co., Sharon, Pa.	2	6	Castings
National Malleable Casting Co., Grant Works, Chicago, Ill.	3	6	Castings
National Malleable Casting Co., Cleveland, Ohio	2	15	Castings
Newport News Shipbldg. & Dry Dock Co., Newport News, Va.	1	6	Castings
Pennsylvania Engineering Works, New Castle, Pa.	1	6	Castings
Pettibone-Milliken Co., Chicago, Ill.	1	2	Castings
Railway Steel Spring Co., Latrobe, Pa.	1	3	Ingots
Simonds Manufacturing Co., Lockport, N. Y.	2	6	Ingots
Sizer Forge Co., Buffalo, N. Y.	2	10	Ingots
Spencer Heater Co., Scranton, Pa.	1	3	Castings
Standard Seamless Tube Co., Economy, Pa.	1	15	Ingots
Standard Stoker Co., Erie, Pa.	1	2	Castings
W. P. Taylor Co., Buffalo, N. Y.	1	2	Castings
Taylor-Wharton Iron & Steel Co., Highbridge, N. J.	1	3	Castings
Taylor-Wharton Iron & Steel Co., Easton, Pa.	1	6	Castings
Tennessee Coal, Iron & Railroad Co., Ensley, Ala.	1	6	Molten ferro-manganese
Timken-Detroit Axle Co., Canton, Ohio	1	2	Castings
Timken Roller Bearing Co., Canton, Ohio	4	6	Ingots
Treadwell Engineering Co., Easton, Pa.	1	2	Castings
Trojan Electric Steel Co., Chicago, Ill.	1	1	Ingots
Twin City Forge & Foundry Co., Stillwater, Minn.	1	3	Castings
Union Electric Steel Co., Carnegie, Pa.	1	6	Ingots
Union Spring & Manufacturing Co., New Kensington, Pa.	1	6	Castings
United Alloy Steel Corporation, Canton, Ohio	1	6	Ingots
United Alloy Steel Corporation, Canton, Ohio	2	15	Ingots
United States Gov., Watertown Arsenal, Watertown, Mass.	1	2	Castings
United States Gov., Watertown Arsenal, Watertown, Mass.	2	6	Ingots
United States Gov., Naval Gun Factory, Washington, D. C.	1	6	Castings
U. S. Gov., Naval Projectile Factory, Charleston, W. Va.	3	6	Ingots
Universal Rolling Mill Co., Bridgeville, Pa.	3	6	Ingots
Vanadium Alloys Steel Co., Latrobe, Pa.	2	3	Ingots
Vulcan Crucible Steel Co., Aliquippa, Pa.	1	3	Ingots
Warren Steel Casting Co., St. Louis, Mo.	1	2	Castings
Warren Steel Casting Co., St. Louis, Mo.	1	3	Castings
Warren Steel Casting Co., Los Angeles, Cal.	2	3	Castings

Summary:

	Furnaces
Total in the United States, including Alaska	145
Total in Canada	18
Total in the United States and Canada on Jan. 1, 1919	163

companies which expanded their original installations into larger plants or which made larger installations. While there have been no such striking developments in 1918, most of these companies and some others have either maintained their output or in some cases slightly increased it by the installation of a new furnace or the substitution of a larger unit for a smaller one.

The table of Heroult furnaces this year gives all those that are now in existence or licensed to operate up to Jan. 1, 1919. Previous to this only those licensed or operating in any one year were included in the table of the review. The total of this type on Jan. 1, 1919, was 145 in the United States and 18 in Canada or 163 in both countries as contrasted with 146 in the United States and Canada on Jan. 1, 1918. The actual number of furnaces licensed in 1918 was 22 as against 62 in 1917. The expansion in 1917 was abnormal and due to war conditions, while that for 1918 was probably more normal. The 1918 total would have been larger, however, had not the signing of the armistice changed the plans of some producers. This is true of other types of furnaces as well. The Heroult furnace continues to maintain its leadership in installations and output. The installations in the United States exceed that of its nearest competitor by 100, the Snyder being credited with 45.

The Snyder furnace expanded its representation quite decidedly in 1918. It is now credited with 45 in the United States and 3 in Canada as against 32 in the United States and 3 in Canada in 1917. On Jan. 1, 1917, there were only 22 Snyder furnaces in the two countries. The growth since then has therefore been 100 per cent in three years.

It is interesting to note the increase in the installations of some of the newer types. In 1918 the Ludlum has increased its installations from 6 to 11, the Booth-Hall from 4 to 11, the Moore from 4 to 12 and the Greene from 1 to 8. The status of the Rennerfelt, the Greaves-Etchells, the Grönwall-Dixon, the Girod and the Webb has changed but little in the aggregate number of installations.

A newcomer in the field in 1918 was the Vom Baur furnace, which is credited with two installations in the United States and three in Japan. The Wile furnace has disappeared altogether so far as can be ascertained, and there is only one Stassano furnace now in existence in either the United States or Canada.

Table of Moore Electric Steel Furnaces, Operating or Contracted for in the United States Jan. 1, 1919. This list is not furnished by the seller of the furnace, the Pittsburgh Furnace Co., but is based on authentic data.

Company and Location	Size, Tons	No. of Furnaces	Product
General Steel Co., St. Francis, Wis.	10	1	Ingots
General Steel Co., St. Francis, Wis.	10	1	Ingots
General Steel Co., St. Francis, Wis.	1½	1	Ingots
Sivyer Steel Casting Co., Milwaukee, Wis.	3	1	Castings
Ohio Steel Foundry Co., Springfield, Ohio	3	1	Castings
Wehr Steel Co., Milwaukee, Wis.	3	1	Castings
Acme Steel & Malleable Co., Buffalo, N. Y.	3	1	Castings
Maynard Electric Steel Co., Milwaukee, Wis.	3	1	Castings
Electric Steel Co., Chicago, Ill.	3	1	Castings
The Stowell Co., So. Milwaukee, Wis.	1½	1	Castings
Gerlinger Steel Casting Co., Milwaukee, Wis.	3	1	Castings
Farrell Cheek Steel Foundry Co., Sandusky, Ohio	3	1	Castings

Total in the United States, 12.

Table of Booth-Hall Electric Steel Furnaces Operating or Contracted for in the United States Jan. 1, 1919, as Sold by the Booth-Hall Co., Chicago, Ill.

Company and Location	Size, Tons	No. of Furnaces	Product
Midland Electric Steel Co., Terre Haute, Ind.	3	1	Ingots and pig iron
Avery Co., Peoria, Ill.	1½	2	Castings
Duriron Castings Co.	¾	1	Castings
West Michigan Steel Foundry Co., Muskegon, Mich.	3	1	Castings
Queen City Foundry Co., Denver, Col.	¾	1	Castings
Monroe Steel Castings Co., Monroe, Mich.	1½	1	Castings
Four Wheel Drive Auto Co., Clintonville, Wis.	1½	1	Castings
Ecorse Foundry & Machine Co., Ecorse, Mich.	3	1	Castings
Consumers Steel Corporation, Chicago, Ill.	3	1	Tool steel
New England Steel Castings Co., East Longmeadow, Mass.	1½	1	Castings

Total in the United States, 11.

Table of Electric Steel Furnaces, Operating or Contracted for in the United States and Canada, Jan. 1, 1919, other than the Heroult, Snyder, Rennerfelt, Gronwall-Dixon, Greaves-Etchells, Booth-Hall and Moore Types.

Company and Location	Size, Tons	No. of Furnaces	Type
Bethlehem Steel Co., South Bethlehem, Pa.	10	1	Girod
Washington Iron Works, Seattle, Wash.	3 & 1	2	Girod
Electric Steel Foundry, Portland, Ore.	1	2	Girod
Washington Steel & Ordnance Co., Washington, D. C.	1	1	Stassano
American Iron & Steel Mfg. Co., Lebanon, Pa.	20	2	Induction
Crucible Steel Forge Co., Cleveland, Ohio	2	1	Induction
Olympia Steel Foundry, Seattle, Wash.	¾	1	Greene
Olympia Steel Foundry, Seattle, Wash.	2½	1	Greene
Everett Steel Co., Everett, Wash.	¾	1	Greene
Aurora Foundry Co., Seattle, Wash.	1½	1	Greene
Pacific Car & Foundry Co., Renton, Wash.	1½	1	Greene
Capitol City Iron Works, Olympia, Wash.	1½	1	Greene
Dayton Malleable Iron Co., Dayton, Ohio	2½	1	Greene
Lamb Machine Co., Hoquiam, Wash.	1½	1	Greene
Ludlum Steel Co., Watervliet, N. Y.	10	3	Ludlum*
Ludlum Steel Co., Watervliet, N. Y.	5	3	Ludlum
Ludlum Steel Co., Watervliet, N. Y.	6	2	Ludlum
Hammond Steel Co., Syracuse, N. Y.	10	1	Ludlum
McCord Mfg. Co., Chicago, Ill.	6	2	Ludlum
Old Dominion Iron & Steel Corporation, Richmond, Va.	3	2	Webb
Hercules Steel Casting Co., Milwaukee, Wis.	6	1	Vom Baur†
Moreland Motor Truck Co., Los Angeles, Cal.	3	1	Vom Baur†
Chrome Steel Works, Chrome, N. J.	1	1	Special
Tivani Electric Steel Co., Belleville, Ont.	3	1	Special
Canadian Brakeshoe Co., Sherbrooke, Que.	2½	4	Special
Canadian Brakeshoe Co., Sherbrooke, Que.	1	1	Special
Canadian Cement Co., Montreal, Can.	6	4	Special
Wabi Iron Works, New Liskeard, Ont.	1	1	Special
Eastern Car Co., New Glasgow, N. S.	6	1	Special
Other furnaces in United States, details lacking		5	Special
Other furnaces in Canada, details lacking		9	Special

Total in United States and Canada: Girod, 5; Stassano, 1; Induction, 3; Greene, 8; Ludlum, 11; Webb, 2; Vom Baur, 2; Special 27. *Total*, 59.

*A Ludlum 3-ton furnace has been sold to the Consolidated Rolling Mills & Foundry Co., Inc., New York, for installation in Chile

†Three Vom Baur furnaces have been sold for installation in Japan.

Table of Greaves-Etchells Electric Steel Furnaces Operating or Contracted for in the United States on Jan. 1, 1919, as Sold by the Electric Furnace Construction Co., Philadelphia

Company and Location	Size, Tons	No. of Furnaces	Product
Norfolk Navy Yard, Norfolk, Va.	6	1	Castings
Puget Sound Navy Yard, Bremerton, Wash.	6	1	Castings
Mare Island Navy Yard, Mare Island, Cal.	6	1	Castings
Charleston Navy Yard, Charleston, S. C.	3	1	Castings
Philadelphia Navy Yard, Philadelphia, Pa.	3	1	Castings
American Radiator Co., Buffalo, N. Y.	6	2	Castings
Ford Motor Co., Detroit, Mich.	½	1	Alloy steels
Halcomb Steel Co., Syracuse, N. Y.	3	2	Alloy steels
Davidson Tool Mfg. Corp., New York	½	1	High speed stee

Total in the United States, 11.

Table of the Number of Electric Steel Furnaces in the United States and Canada

Type	In the U. S. Jan. 1, 1919	In Canada Jan. 1, 1919	Total in U. S. and Canada Jan. 1, 1919	Total in U. S. and Canada Jan. 1, 1918	Total in U. S. and Canada Jan. 1, 1917
Heroult	145	18	163	146	84
Snyder	45	3	48	35	22
Rennerfelt	13	..	13	13	13
Greaves-Etchells	11	..	11	12	..
Grönwall-Dixon	12	1	13	12	9
Ludlum	11	..	11	6	5
Girod	5	..	5	5	4
Booth-Hall	11	..	11	4	..
Moore	12	..	12	4	..
Induction	3	..	3	3	3
Webb	2	..	2	2	..
Stassano	1	..	1	1	1
Greene	8	..	8	1	1
Vom Baur	2	..	2	..	..
Wile	..	..	..	1	1
Special	6	21	27	24	12
	287	+ 43 =	330	269	155

As to furnaces classed as special, very little can be said. The total in the year shows a net gain of 3, or from 24 to 27, in both the United States and Canada. Of these 21 are in Canada, many of them said to be similar to certain types in this country. Some of them are making low phosphorus pig iron from scrap steel.

The induction, as contrasted with the arc furnace, still remains in the background. There has been absolutely no development in this type of furnace in the last year nor in the last few years. The arc furnace continues to be the popular medium of transmitting the electrical heat to the material to be melted and refined, whether it is three-phase, two-phase or single-phase.

One of the tables gives the number of furnaces of each type in the United States and Canada on Jan. 1, 1919, with the total a year ago and two years ago. In the last two years, or since Jan. 1, 1917, the total number of furnaces in the two countries has more than doubled, or from 155 to 330. The total was only 81 on Jan. 1, 1916, and 19 on July 1, 1913.

Progress in Europe and the World

Owing to world war conditions it has been impossible this year to even estimate the status of the electric steel industry in countries outside the United States and Canada. The table, however, which was published a year ago is reproduced as a matter of record, leaving the column for furnaces in foreign countries practically blank, except in a few cases where certain new installations have been announced, principally sales by American furnace makers. Adding those to the total in the world on Jan. 1, 1918, brings the total on Jan. 1, 1919, to not less than 815, assuming estimates a year ago to have been fairly accurate.

Table of Electric Steel Furnaces by Countries of the World Operating or Contracted for on Jan. 1, 1918, with Totals for 1917, 1916, 1915, 1913 and 1910

	Total Jan. 1, 1919	Total Jan. 1, 1918	Total Jan. 1, 1917	Total Jan. 1, 1916	Total Jan. 1, 1915	Total July 1, 1913	Total March 1910
Germany and Luxemburg	...	91	52	53	46	34	30
Austria-Hungary	...	31	18	18	18	10	10
Switzerland	...	4	4	4	3	2	2
Italy	...	40	29	22	22	20	12
France	...	50	29	21	17	13	23
Great Britain	...	131	88	46	16	16	7
Belgium	...	...	3	3	3	3	3
Russia	...	21	16	11	9	4	2
Sweden	...	50	40	23	18	6	5
Norway	...	12	9	6	2	3	...
Spain	...	2	2	2	1	1	...
Japan	11	4	2	1	1	1	...
South Africa	...	2	1	1	1	4	3
Australia	2	1	1	1	1	...	...
Chile	3	2	...	1	...	...	...
Denmark	...	2	1	...	...	...	...
Brazil	2	...	...	...	...	...	...
India	1	...	...	...	...	...	...
Location not given	...	21	21	9	12	...	...
*Total outside the United States and Canada	...	464	316	222	170	118	101
United States	287	233	136	73	41	19	10
Canada	43	36	19	8	2	3	3
Total in the United States and Canada	330	269	155	81	43	22	13
Grand total in the world	815†	733	471	303	213	140	114

*Largely estimated on Jan. 1, 1918.

†Obtained by adding the known new installations to the estimate for Jan. 1, 1918.

It is probable that the greatest expansion in 1918, outside of the United States, has been in England, the same as took place in 1917. Later reports show that the number of furnaces on Jan. 1, 1918, was 140 instead of 131. Of these over 50 are Heroult furnaces, with the Greaves-Etchells, Electro-Metals, Rennerfelt, Snyder, Stassano, Stobie following in the order named.

It is also likely that the use of the electric furnace in Germany has greatly expanded for war purposes, particularly for making gun steel and other important war material formerly believed possible only from open-hearth or Bessemer steel.

As to production, data even for 1917 is not yet published, but there is no doubt that the percentage of increase has been larger in 1918 than in the number of furnaces. A feature has been the war production of ordnance electric steel castings.

The year 1919 opens with some uncertainty as to the future of this industry both in the United States and Canada and perhaps in the world. Development has been largely accelerated by the war. While expansion in the next year or two will probably not be as large as in the last three, it is believed that it will continue.

The Union Switch & Signal Co., Swissvale, Pa., has about completed a large Government contract for aeroplane engines, and contemplates using the facilities, organization and experience thus gained in the manufacture of high-grade engines for passenger car and truck service. Its new five-story buildings are of fireproof construction and have ample capacity for quantity production.

E. A. S. Clarke Heads New Export Company

Retires from Lackawanna Steel Co. and Is Succeeded by C. H. McCullough—Announces Policy of Consolidated Steel Co.

E. A. S. Clarke resigned as president of the Lackawanna Steel Co., effective Jan. 1, in order to accept the presidency of the Consolidated Steel Company and he has been succeeded by C. H. McCullough, Jr., who has been vice-president and general manager of the Lackawanna Steel Co. since 1905. Mr. McCullough was born in Philadelphia in 1868. After his graduation from Stevens Institute of Technology, Hoboken, N. J., in the class of 1891, Mr. McCullough went into the service of the Illinois Steel Co. at the South works, working up to the position of second vice-president, and resigned to accept the vice-presidency of the Lackawanna Steel Co. in 1905.

E. A. S. CLARKE

C. H. MC CULLOUGH

Changes in the Lackawanna Steel Co.'s officers resulting from the resignation of Mr. Clarke were: C. R. Robinson, general manager of sales, was promoted to the position of vice-president in charge of sales; G. F. Downs, general superintendent, was made a vice-president in charge of operations, and W. H. Dupka was elected comptroller to succeed L. W. Hesselman, who has resigned to become comptroller of the new export corporation. An amendment to the by-laws was adopted creating the office of chairman of the board, which will be filled by Moses Taylor, who resigned as vice-president.

Two important steps were taken last week in the organization of the new export company by leading independent manufacturers of steel. The name originally selected was Independent Steel Products Corporation, but it has been decided to call the new company the Consolidated Steel Products Company. Another important step was the selection of Mr. Clarke to be president. H. H. Barbour has resigned as eastern district sales manager of the Lackawanna company to join the new company.

The Consolidated Steel Company will be the exclusive agency for exporting the merchant iron and steel products of the following companies, whose combined annual ingot capacity is about 12,000,000 tons:

Bethlehem Steel Co.
Brier Hill Steel Co.
Lackawanna Steel Co.
Lukens Steel Co.
Midvale Steel & Ordnance Co.
Republic Iron and Steel Co.
Sharon Steel Hoop Co.
Trumbull Steel Co.
Whittaker-Glessner Co.
Youngstown Sheet & Tube Co.

It is expected by its organizers that other steel producing interests will join the Consolidated company later and that eventually it will represent in export trade, substantially all important steel producing companies of the country, outside of the United States Steel Corporation.

The company expects to incorporate immediately and to begin active business on Jan. 2 next. In addition to its principal office in New York, the location of which has not yet been decided on, it will have branches throughout the world wherever the introduction and sale of American iron and steel products makes it desirable.

Mr. Clarke, in speaking of his acceptance of the presidency, said that while he realized there is a large amount of hard work ahead, the position appealed to him on account of the opportunity which it presented of serving not only the industry, but the whole country. "It will," he said, "be our policy to be fair to everybody." While the Jones & Laughlin Steel Co., Pittsburgh Steel Co. and other manufacturers have not come into the new company, it is understood that their decision is not necessarily final.

E. A. S. Clarke was born at Ottawa, Canada, Jan. 1, 1862, and after a preliminary schooling in Philadelphia and abroad, went to Harvard University from which he graduated in 1884, receiving the degree of Bachelor of Arts. In that year, he entered the employ of the Spang Steel & Iron Co., Sharpsburg, near Pittsburgh, and continued until June, 1885, when he became connected with the Union Steel Co., Chicago, which afterwards was merged into the Illinois Steel Co., of which he became general manager. In 1900, he became general manager of manufacturing of the Deering Harvester Co. and about three years later entered the service of the International Harvester Co., where he organized and built up the Wisconsin Steel Co., a subsidiary company of the Harvester company. In December, 1904, he became president of the Lackawanna Steel Co. During the time of his presidency, the Lackawanna company has been radically changed and improved. While the number of blast furnaces has been increased from seven to nine and the production of steel correspondingly, fully as an important a change has been made in the character of the product, which has been changed from Bessemer to open-hearth. The position of the company financially has also been vastly improved. In 1904 it had no surplus and at the end of 1918 it has a surplus of $34,000,000. New ore properties have been acquired, many additions to plants were made and several less valuable properties were sold.

Mr. Clarke has been an active member of the American Iron and Steel Institute since its organization and throughout the period of co-operation of the Government and price fixing, has been secretary of the most important committee that on Steel and Steel Products. His duties as secretary have been arduous and he has worked with untiring energy and with such success as to receive the highest commendation from officials of the Government and manufacturers of iron and steel products.

New Iron and Steel Works Construction

Open-Hearth Capacity Completed Last Year 1,945,000 Tons—That Now Building Represents 1,130,000 Tons

While the new open-hearth capacity completed and put in operation in the United States in 1918 was of considerable proportions, it by no means equals the remarkable records made in both 1917 and 1916. The total, however, exceeds the increase in 1915. In new work initiated or planned representing additions that will probably be made in 1919 to the steel-making capacity, the year 1919 promises to fall considerably below any record made in the last two or three years.

Newly Added Open-Hearth Furnaces

In 1918 the new steel-making capacity completed amounted to 1,945,000 gross tons, or a little less than half of the remarkable record made in 1917 as reported in this review a year ago, at 4,326,500 tons. It also compares with the unusual record of 4,205,000 tons completed in 1916. The present summary shows 46 open-hearth furnaces completed in 1918 with an annual capacity of 1,945,000 gross tons, while in 1917 the total completed was 97 furnaces with an annual capacity of 4,326,500 tons. This compares with 103 furnaces with an annual capacity of 4,205,000 tons completed in 1916.

New Open-Hearth Furnaces Completed in 1918

	Number Furnaces	Annual Capacity, Gross Tons
Independent companies	42	*1,585,000
United States Steel Corporation	2	†360,000
Total	46	1,945,000

*Includes the conversion of one 20-ton furnace to a 50-ton furnace by the Midvale Steel & Ordnance Co.
†Includes increase in capacity of the open-hearth plant at Ensley, Ala., by adding one 25-ton converter and one 100-ton tilting furnace to work duplexing.

The additions to open-hearth capacity in 1918 were the following: Lukens Steel Co., Coatesville, Pa., six 100-ton furnaces; Trumbull Steel Co., Warren, Ohio, seven 100-ton furnaces; Steel & Tube Co. of America, Chicago, four 90-ton furnaces; Youngstown Sheet & Tube Co., Youngstown, Ohio, three 100-ton furnaces; Andrews Steel Co., Newport, Ky., two 100-ton furnaces; Canton Sheet Steel Co., Canton, Ohio, two 90-ton furnaces; Republic Iron & Steel Co., Youngstown, Ohio, two 70-ton furnaces; Worth Steel Co., Claymont, Del., three 90-ton furnaces; Tacony Ordnance Corporation, Tacony, Pa., two 40-ton furnaces; Pacific Coast Steel Co., Seattle, Wash., two 40-ton furnaces; Erie Forge Co., Erie, Pa., two 25-ton furnaces; the Follansbee Brothers Co., Pittsburgh, one 40-ton furnace; the Philadelphia Roll & Machine Co. (Taylor-Wharton Iron & Steel Co.), Philadelphia, one 25-ton furnace; Central Iron & Steel Co., Harrisburg, Pa., one 120-ton furnace; Utah Iron & Steel Co., Salt Lake City, Utah, one 50-ton furnace; Keystone Steel & Wire Co., Peoria, Ill., one 75-ton furnace; Donner Steel Co., Buffalo, one 75-ton furnace; Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., one 30-ton furnace; Reading Steel Casting Co., Reading, Pa., one 20-ton furnace; and the Tindel-Morris Co., Eddystone, Pa., one 20-ton furnace.

The United States Steel Corporation in 1918 added one 100-ton furnace at its duplexing plant at Gary, Ind.; and one 100-ton furnace, and one 25-ton converter at the plant of the Tennessee Coal, Iron & Railroad Co., at Ensley, Ala. The Midvale Steel & Ordnance Co., at its Philadelphia plant converted one 20-ton furnace to a 50-ton furnace in 1918.

Projected Open-Hearth Construction

Open-hearth furnaces under construction, most of which it is expected will be completed in 1919, number 16 which compares with 35 in 1918, 72 in 1917 and 91 in 1916. The total estimated capacity of the furnaces projected for completion in 1919 is 1,130,000 gross tons as compared with 1,645,000 tons in 1918 and 4,515,000 tons for the 72 furnaces in 1917. Last year, in the list of furnaces under construction and projected, the Bethlehem Steel Corporation was credited with a duplexing plant at its Maryland works at Sparrows Point, consisting of four 200-ton tilting open-hearth furnaces, and four 25-ton Bessemer converters. This project was not completed in 1918 and is planned to be constructed in 1919, its capacity being included in the foregoing estimate.

New installations contemplated in 1919 by some of the principal companies are as follows: Lukens Steel Co., Coatesville, Pa., two 100-ton furnaces; McKinney Steel Co., Cleveland, two 100-ton furnaces; Pacific Coast Steel Co., Seattle, Wash., two 40-ton furnaces; John A. Roebling's Sons Co., Trenton, N. J., two 40-ton furnaces; Wayne Steel Co., Erie, Pa., two 25-ton furnaces; the Atlantic Steel Co., Atlanta, Ga., one 50-ton furnace and the United Steel Co., Everett, Wash., one 25-ton furnace, besides the four at Maryland plant of the Bethlehem Steel Corporation.

The United States Steel Corporation at its South Works at South Chicago, will add one 25-ton converter to its duplexing plant.

The prospective increased capacity in 1919 is represented by the following table:

New Open-Hearth Furnaces Under Construction Jan 1, 1919

	Number Furnaces	Annual Capacity, Gross Tons
Independent companies	16	*1,030,000
United States Steel Corporation	None	†100,000
Total	16	1,130,000

*Includes product of duplexing plants, with total of 4 converters at Sparrows Point
†Represents increase due to the addition of one 25-ton converter at South Works of Illinois Steel Co.

New Blast Furnace Construction

New blast furnaces completed in 1918 do not approach the remarkable record made in 1917. Our data show a total of eight as compared with 14 in 1917 and only 4 in 1916. The eight furnaces completed represent a capacity of 1,444,000 gross tons of pig iron. For 1919 our statistics show that there are seven blast furnaces under construction, most of which will probably be completed during the year. Four of these furnaces were listed as projected for completion in 1918 but are still uncompleted. The seven projected furnaces have an estimated capacity of 1,260,000 tons of pig iron per year. The following table gives details of new blast furnaces completed in 1918 and at present under construction.

Company	Completed 1918	Under Construction or Projected
Brier Hill Steel Co.	1	..
Lackawanna Steel Co.	2	..
Alan Wood Iron & Steel Co.	1	..
Bethlehem Steel Corporation:		
Steelton plant	1	1
Maryland plant	..	2
Henry Ford	..	2
Weirton Steel Co.	..	1
Pittsburgh Crucible Steel Co.	..	1
Steel Tube Co of America:		
Iroquois Iron Co.	1	..
Mark Plant	1	..
U. S. Steel Corporation:		
Gary Plant	1	..
Total	8	7

The four furnaces credited to the Gary plant of the United States Steel Corporation as projected in our review last year are not reported this year.

The Steel Corporation

New construction completed in 1918 and that under way as of Jan. 1, 1919, by subsidiary companies of United States Steel Corporation is as follows:

Carnegie Steel Co.

Completed

Edgar Thomson Works: Rebuilding blast furnace G, and a central pumping station.
Duquesne Works: A 15,000 kw. steam turbine driven generator and a new boiler plant at No. 2 power house.
Homestead Works: A pulverized coal-burning equipment for open hearth No. 3; boiler installatoin at the 30-in., 42-in. and 128-in. mills, and additional soaking pits at the 32-in. slabbing mill.
Farrell Works: Reconstruction of billet and bar mill, and additions to ore stock yard.
Clairton Works: A by-product coke plant (640 ovens), including tar and ammonia sulphate recovery, and a benzol recovery plant.
Ohio Works: Dry gas cleaning plant at blast furnace No. 1.
McDonald Mills: An 8-in. and 10-in. bar mill and two 8-in. hoop mills.
Mingo Works: Car dumper.

Under Way

Edgar Thomson Works: Rebuilding blast furnaces E and F, and a new 10-ton ore bridge.
Duquesne Works: Rebuilding No. 4 blast furnace.
Homestead Works: Additional reheating furnaces at 48-in. and 110-in. plate mills.
Carrie Furnaces: A 15,000-kw. turbo-generator complete with boilers, etc., and additions and replacements at Nos. 1 and 2 blast furnaces.
Farrell Works: Reconstruction of blast furnace No. 3 and a flue dust sintering plant.
Clairton Works: 768 additional by-product coke ovens, including tar and ammonia sulphate recovery, additional benzol recovery plant, concentrated ammonia plant, and new boiler installation.

Illinois Steel Co.

Completed

South Works: Six gas-driven blowing engines at blast furnaces, one 20-ton Heroult electric furnace, and ore unloading facilities and increased ore storage capacity.
Gary Works: One blast furnace, reported last year as practically completed; one 20-in. merchant mill; one 10-in. merchant mill, practically completed; a steel wheel plant, and 140 additional by-product coke ovens.
Joliet Works: One 5000-kw. turbogenerator.
Milwaukee Works: Ore unloading equipment.

Under Way

South Works: Additional soaking pits and improving heating furnaces at slabbing mill; additions to 90-in. and 132-in. plate mills, and additional converter at duplexing open-hearth plant.
Gary Works: Additions to No. 4 electric power station, tie plate department, and additional furnace at duplexing open-hearth plant.

Minnesota Steel Co.

Completed

Duluth: Benzol recovery plant and refractory plant.

National Tube Co.

Completed

Lorain Works: By-product coke plant of 208 ovens, benzol recovery plant, and concentrated ammonia plant.
Ellwood Works: New bar mill and piercing mills and equipment for the manufacture of seamless tubes.

Under Way

National Works: 10,000-kw. turbo-generator complete with boilers, etc.
Gary Tube Plant: Self-contained tube plant including four blast furnaces.

American Steel & Wire Co.

Completed

Newburg Steel Works: By-product coke plant of 180 ovens and benzol recovery plant.
Cuyahoga Works: Wide flat mill and cold rolling equipment.
Shoenberger Works: New boiler installation.
Trenton Works: Additional capacity for rope wire and wire rope and a sprinkler system.
South Works: Additional capacity for rope wire.
New Haven Works: Additional capacity for rope wire and wire rope.
Farrell Works: New boiler installation.
Donora Zinc Works: Sulphuric acid plant.

Under Way

Donora Steel Works: Flue dust sintering plant.
Newburg Steel Works: Revamping power station.

American Sheet & Tin Plate Co.

Completed

Chester Works: Extension to boiler plant.

Under Way

Gary Works: 24 additional tin mills.
Chester Works: One additional tin mill.
Cambridge Works: One additional tin mill.

American Bridge Co.

Completed

Ambridge Works: Additions to power plant.

Under Way

Gary Works: Forging plant.
Pencoyd Works: Water purifying plant and new boiler installation.

Universal Portland Cement Co.

Completed

Buffington Plant: Waste heat boilers and turbo-generator.

Tennessee Coal, Iron & R. R. Co.

Completed

Ensley Works: Equipment for recarburizing metal for open-hearth department and an additional open-hearth furnace and converter, practically completed.
Bessemer Rolling Mills: Improvements to plate mill.
Fairfield Works: 45-in. blooming mill, 110-in. sheared plate mill and a combination bar and structural mill, all practically completed.
Fairfield By-product Coke Plant: Concentrated ammonia plant.

Under Way

Emsley Works: 7500-kw. turbo-generator.
Fairfield Works: Fabricating shops, additional reheating furnaces, etc., and a central hospital for Birmingham district.
Fairfield By-product Coke Plant: 154 additional by-product coke ovens and enlarging benzol plant.

Federal Shipbuilding Co.

Completed

Ten shipways and fitting-out dock, buildings for plant, cranes, locomotives, etc.

Under Way

Two additional shipways and additions to boiler shop.

Chickasaw Shipbuilding Co.

Under Way

Shipbuilding plant at Mobile, Ala., comprising 10 shipways, fitting-out dock, etc.

Bethlehem Steel Corporation

The extensions and improvements to the Bethlehem Steel Corporation, New York, completed in 1918 or planned for 1918 are as follows:

Bethlehem Plants, Bethlehem, Pa.

Completed in 1918: One 2-ton electric furnace for electric steel foundry, ingot mold foundry, motor drive for 40-in. blooming mill tables; complete 12-in. structural mill for rolling light structural shapes and flats; 60-in. cold saw for structural shipping yard; two-story extension to machine shop No. 4; complete machine shop and tool equipment for manufacture of large guns up to 16 in.; machine shop and equipment for manufacture of rough machined gun forgings; a complete shop for the manufacture of gun carriages as well as extensive additions to equipment of No. 4 machine shop for increased output of field artillery; a complete projectile shop, consisting of forge and machine shop for the manufacture of large size shell; equipment for recovery of benzol and light oil, and a coke braize

screening station; 6000 hp. boiler house, two 2000 kw. rotary converters with accessories, 60 gondola cars, 25 side dump cars and 10,000-kw. transformer station.

Extensions under way: Two hundred and fifty thousand gallon fuel oil storage tank; addition to dispensary; four batteries of boilers and equipment for No. 1 boiler house; ultra violet ray sterilizer for drinking water; transmission line to new shops; one 1000-kw. motor generator set; one 2000 cu. ft. air compressor with motor; three pit cranes for soaking pits; slab loader at 46-in. blooming mill; new tempering furnace at No. 1 tempering plant; 30-ton crane for treatment department; boring machine and furnace for ingot boring shop; four-bay two-story extension to machine shop No. 4; 20 houses and recreation room at coke works; five saturators and equipment for recovery of sulphate of ammonia.

Steelton Plant, Steelton, Pa.

Completed in 1918: Installation of four boilers; battery of 60 Koppers by-product coke ovens with complete by-product recovery equipment; one 500-ton blast furnace; new soaking pits and extension to 44-in. mill; additional equipment for machine shop, and miscellaneous tools and equipment.

Extensions under way: Owing to war conditions it was impossible to complete many of the extensions reported under way in the edition of THE IRON AGE of Jan. 3, 1918. These extensions include three 3000-kw. generator sets; one 500-ton blast furnace; gas washing equipment for gas engine fuel; cooling pond; building for gas washers; extension to foundry; extension to splice bar shop, new beam and structural shop.

Maryland Plant, Sparrows Point, Md.

Completed in 1918: Additional electrical equipment, including one 7500-kw. transformer; Brassert Bacon gas washers for blast furnace gas; additional reheating furnace for 36-in. x 110-in. plate mill; extension and additional equipment for iron foundry.

Work under way: Four gas-driven electric generators; two 500-ton blast furnaces; eight gas-driven Bethlehem blowing engines; 240 Koppers by-product coke ovens, including by-product and benzol plant; coal crusher and delivery plant; improvements to ore dock; new duplexing plant of four tilting open-hearth furnaces, and four 25-ton converters complete with mechanical gas producers, mold yard and all other auxiliaries; continuous reheating furnace for 26-in. roll mill; 60-in. universal plate mill complete; a new roll shop and necessary equipment; 40-in. blooming mill in combination with 24-in. and 18-in. continuous mills.

In addition to the above improvements, there are 64 houses under construction at Sparrows Point and a complete sewage system consisting of sewers and disposal plant.

Lebanon Plant, Lebanon, Pa.

Completed in 1918: At the American Iron & Steel Works, rebuilding of open-hearth furnace, two brick buildings for time clocks and card racks and a 10-ton electric locomotive, were completed during the year.

At the North Lebanon works the concentrating and sintering plants for Cornwall ore were completed.

Extensions under way include a 500-ton oil-flotation plant for the recovery of copper bearing minerals in the tailings from the iron-ore concentrators.

Bethlehem Shipbuilding Corporation

At the Fore River Plant, Quincy Works, there was completed in 1918: Extension to power house, including equipment; electric sub-station; trimming press, forging hammer and heating furnaces for blacksmith shop; building slip for the construction of largest type of battle cruisers; additional machines and handling facilities for the machine shop; a complete new galvanizing plant; three additional slips for construction of submarines, and an additional concrete pier. During 1918 the Government-owned shipyard at Squantum, Mass., together with a boiler shop at Providence, R. I., and a machine shop at Buffalo for manufacture of steam turbines, were completed and put into operation. These three plants are operated by the Bethlehem Shipbuilding Corporation, Ltd., as agents for the United States Government. At the Quincy Works the United States Government installed extensive additions for speeding up the production of destroyers. These additions include a new machine shop complete, two new office buildings, an extension of street railroad facilities to the plant; two large air compressor units; four additional destroyer slips; locomotive cranes, cars and two new store houses.

At the Union Plant there was completed in 1918: A new office building; a new foundry; also the following improvements at the Alameda division; machine shop 160 ft. x 500 ft. with complete equipment for manufacture of turbines and reduction gears; a large warehouse, and miscellaneous additions to existing departments. At the Risdon Works, leased by the United States Government from the United States Steel Products Co., extensive improvements have been made, including construction of ways and slips; additional machine tools; new wharf; galvanizing plant; blacksmith shop and marine machine shop. The Risdon Works are operated by the Union plant of the Bethlehem Shipbuilding Corporation, Ltd., as agents for the United States Government in the construction of destroyers. In addition to the above, the United States Government has made extensions to the Union plant in order to speed up the construction of destroyers. In the main, these improvements consist of a temporary office building, additional machine tools for the Alameda turbine shop, and a new galvanizing plant. Work in progress includes a sewer system at Alameda works, new equipment for marine machine shop, construction of a wharf in the shipyard department and a new warehouse. During the year the Emergency Fleet Corporation made extensions to the Alameda Works of the Union Plant to increase the output of merchant ships. These extensions include two building slips; a marine fitting out shop, with equipment; a new office building; equipment for plate shop and angle shop; extension to wharf, installation of fire-mains; improvements of roads; two locomotive cranes and other miscellaneous equipment. Early in the year work was started on a complete ten way shipyard for the Emergency Fleet Corporation, for the construction of troop ships. With the signing of the armistice this work was canceled.

At the Sparrows Point plant work completed during the year includes a building for employment bureau and dispensary and a new fabricating shop with equipment. The Dry Dock and Ship Repair Plant is practically completed. Work in progress includes a hydraulic flanging press for the boiler shop and additional machine tools for the machine shop. During the year the Emergency Fleet Corporation have made large extensions to this plant as follows:

A new office building and equipment, restaurant and equipment complete, two 4000-cu. ft. electrically driven air compressors; new electric shop. Three new building slips with necessary auxiliary departments are now under way.

At the Harlan plant, Wilmington, Del.: Two new water tube boilers and the new two-story plumbing shops have been completed. Other equipment erected during 1918 include reporting booths and band stand; one 10-ton locomotive; connection with the Baltimore & Ohio Railroad; a 3000-lb. bell hammer and a building for fitting-out shop. Work in progress includes fitting up of canvas and upholstery shop in car shop No. 4. At the Harlan plant the Emergency Fleet Corporation has made additions to increase the output of the plant These include the rebuilding of No. 1 launching way, air compressors in the boiler house; storage battery locomotive; one 10-ton locomotive crane, and protective measures such as searchlights, fire apparatus, etc.

At the Moore plant, Elizabethport, N. J.: Additional air compressors and considerable miscellaneous piping and equipment were added.

Ore Steamship Corporation: Three ore steamers were launched and put into service during the year, completing the present construction program.

Bethlehem Mines Corporation

At Bethlehem quarry, across the river from the Bethlehem Steel Co.'s Bethlehem plants, the following

equipment was completed during the year: A complete crushing plant, consisting of three buildings and all necessary crushers, screens, etc.; a telpherage system for delivering stone to stock piles of Bethlehem Steel Co., and substation, locomotive repair shop, etc., practically completing the construction program.

At McAfee quarry, McAfee, N. J., an electric power plant, water softening plant, stripping machinery and five bungalow houses have been completed. Work in progress includes a complete crushing plant and changing of former power house into a machine shop.

At Lebanon quarry a new limestone property was acquired during the year.

Hanover quarry, located in Oxford and Berwick townships, Adams county, near Hanover, Pa., was acquired during the latter part of 1917. It is estimated that this quarry contains 33,000,000 tons of fluxing stone, which will be used principally at the Maryland plant of the Bethlehem Steel Co. Improvements in course of construction include screening building, railroad tracks and auxiliary equipment.

Cuban and Chilean Iron Mines Co.

The construction program of the Bethlehem Chile Iron Mines Co., at the Tofo mines, near Coquimbo, Chile, was practically held up during 1918, owing to the scarcity of bottoms for the transportation of material.

At the mines of the Spanish-American Iron Co., in Cuba, the following improvements have been completed: A 30,000-ton ore storage plant and ore bridge at the Daiquiri mines and three dragline excavators at the Mayari mines.

The balance of the construction program necessary to bring the output of these mines to 1,000,000 tons per year has been temporarily suspended, due to war conditions.

At the Penn Mary Coal Co.'s property at Heilwood, Pa., the construction works for the new mining operation, known as mine No. 11, was practically completed during the year. Additional miscellaneous equipment, including pumps, drills, hoists and substation equipment was also installed.

Bethlehem Loading Co.

During the latter part of 1917 the Bethlehem Loading Co. was organized to operate, under lease agreement, the Redington, Pa., and New Castle, Del., shell loading plants of the Bethlehem Steel Co. At the New Castle plant the United States Government installed extensive additions for increased output of loaded shells. These include buildings for manufacture of boosters; converting of 3-in shell loading building to 155-mm. shell loading building; four high explosive magazines; a new office building; a general store house, and miscellaneous equipment, such as automobile trucks, etc. The Bethlehem Loading Co. also operates a large shell loading plant at Belcoville, N. J., near May's Landing. This plant, constructed by the United States Government, includes a 75-mm. plant, a 155-mm. plant an 8-in. plant, necessary shop, administration buildings, cafeterias, etc.; railroads and equipment; electric power house, water plant, steam plant, sewage system, and a complete village of dwellings and barracks for workmen.

Youngstown Sheet & Tube Co.

The Youngstown Sheet & Tube Co., Youngstown, Ohio, completed and placed in operation in 1918 the following new construction, the greater portion of which was begun in 1917:

Three 100-ton open-hearth furnaces, bringing the total number in operation to 12, all of which are of the same capacity.

An 84-in. tandem plate mill, with complete equipment, all driven by electric power.

Two additional batteries of Koppers by-product coke ovens, with necessary additions to by-product and benzol equipment. This brings the number of ovens in operation to 306.

Four additional pit furnaces, with a new stripping building, mold yard and skull cracker.

An extension to power house No. 4, with the installation of an additional 6000 kw. turbogenerator.

An additional power sub-station, known as No. 7, completely equipped.

Locomotive repair shops with capacity for repairs and maintenance of 28 locomotives and 13 steam portable cranes.

A system of welfare stations and washrooms equipped in the most modern manner has been installed. and a complete system for distributing refrigerated drinking water to sanitary fountains throughout the main plant has been completed and placed in operation.

Commodious and modern buildings for a general warehouse and an oil storage house have been erected and are in service.

Work begun in 1918 which it is expected will be completed in 1919 includes:

An extension to the plate mill slab yard is being made of 200 ft., making the total length 340 ft.

An extension is also being made to facilitate the handling of scrap from the plate mill. In this extension scrap may be handled in open-hearth charging boxes direct, eliminating the rehandling necessary when scrap was taken away in gondola cars.

A thaw house for coal cars, having a capacity of 20 cars. It is 405 ft. long by 38 ft. 4 in. wide. It is of concrete column construction with hollow tile walls and roof. Roof trusses are of steel. Three tracks pass through the building, two for coal cars and one in the center for the electric shifter. Electrically operated steel rolling doors close the building at the ends after the cars are placed. The heater equipment is installed in a second story in the center of the building. It consists of a coke-oven gas or coal-fired furnace and two fans, each having a capacity of 60,000 cu. ft. per min. The furnace is designed to produce a temperature of the air from 150 to 200 deg. Fans draw air from the inside of the thaw house through a return duct in the center under the roof, and deliver the air into two ducts, one on each side of the return duct, from which flues, spaced every 5 ft., carry the air to openings in the center of the tracks under the cars.

At the blooming mill pit furnaces four additional Morgan producers have been installed. In connection with this, there were changes and additions made to the gas mains, overhead mains being installed in addition to the underground mains at the producer and overhead mains substituted for the underground mains at the pits. The roof of the producers' house was raised for the purpose of better ventilation.

A locomotive coaling and ash-handling station is being erected, consisting of a concrete bin having a storage capacity of 300 tons, and a track hopper from which the coal is taken to the bin by means of a skip bucket. Adjustable spouts with gates reach both narrow and standard gage tracks. A sand bin and drier are also included in the structure. The ash pit is of concrete, with tracks, standard on one side and narrow on the other, carried on girders. The ashes dumped from locomotives fall upon the inclined sides of the pit and slide to the center from which they are removed by a crane.

A water development program has been started by which a system of wells on the company's property south of the East Youngstown plant will provide a water supply suitable for condensing purposes at the benzol plant.

At the Hubbard plant the old system of hand loading to the skips is being replaced by a mechanical system. This work is being done without interfering with the operation of the furnaces. The bins are of the Hoover & Mason roller feed type, there being 80 rollers, of which 40 are for ore, 28 for coke, and 12 for limestone. The bins will provide storage capacity for 3100 tons of ore, 520 tons of coke and 660 tons of limestone. This is approximately a two days' supply. The bins may be filled either from a larry car, which is loaded from the present ore bridge, or direct from cars running over the top of the bins. The bins are arranged in two groups of two sets in each group, with a ventilating space between the sets. Each set is 154 ft. long, the bins themselves being 70 ft. long. The construction is a combination of reinforced concrete and steel, the approach and tail tracks being carried on a concrete struc-

ture. The bottom of the ore bins are steel plates, while the bottom of the stone and coke bins are of vitrified brick on concrete. The furnace charges are discharged from the bins into scale cars, of which there are two, either of which will reach any of the bins and both furnace skips. The screenings from the coke bins are carried on a belt conveyor and discharged into railroad cars. Some changes will be required to the present furnace skip pits to accommodate the new system, the side walls being removed and the pit at No. 1 furnace being lowered 10 ft.

The Buckeye Land Co., a subsidiary of the Youngstown Sheet & Tube Co., has enlarged the housing program started in 1917. The 100 houses originally planned for the 219 acre Loveland farms plot have been completed and are nearly all occupied. The unit concrete group houses for 146 families at East Youngstown have been completed and are occupied.

Another tract of 80 acres has been opened south of the Loveland farms tract, and plotted for 400 lots. Contracts have been let for 50 frame houses of 6 rooms and bath. These houses are planned for sale to foreign laborers.

Another group of 135 unit concrete houses at East Youngstown has been started. These houses are arranged for four rooms and bath, the building ranging from 2 to 8 family units. These are intended for the use of colored laborers.

The Buckeye Coal Co., another subsidiary of the Youngstown Sheet & Tube Co., has, at its property at Nemacolin, Pa., completed work to such an extent that coal is now being taken out. The main air shaft 20 ft. in diameter, 250 ft. deep with fan house has been completed. These fans have a capacity of 400,000 cu. ft. per min. and are equipped with a double drive. The man and material slope has been completed. This slope is of 19 deg. and is being used for taking out the product of the mine until the completion of the main shaft, upon which work is being carried on. The slope tipple is equipped with two rotary dumps and is capable of handling six cars per trip. A repair shop, with forge, machine tool and boiler shop equipment sufficient to provide for all ordinary repairs has also been erected and equipped.

A small boiler plant suitable for all steam requirements except power has been provided. Electric power is obtained from an outside source. Included in the development of this work is a housing plan, which is well under way. A town site with streets, water works, sewers and sewage disposal plant and electric lights has been very largely developed. This includes the construction of 124 four, five and six-room houses with bath room and sanitary facilities, for the use of the employees. Larger houses have been provided for the officials. Club house, hospital, and office buildings have been erected.

Republic Iron & Steel Co.

At the Bessemer and Brown-Bonnell departments of this company at Youngstown, Ohio, there was completed in 1918 a 60-ft. addition to the building and new hot beds of the 20-in. skelp mill, and rearrangements and additions were made to the feed water heaters, as well as the installation of a storage tank and connections to the water-softening plant. Alterations and extensions were made to the district office buildings and a new claim office was erected. Minor improvements include a 1850-cu. ft. air compressor, a rundown table at the 20-in. skelp mill and a 100-ton track scale for the 8-in., 12-in. and 10-in. continuous mill and the 20-in. bar mill building, besides a 52-ft., 200-ton plate fulcrum standard gage railroad track scale. In 1919 the company has under construction a 40-in. blooming mill table and housing.

At its open-hearth plant at Youngstown there was completed in 1918 open-hearth furnaces No. 13 and No. 14 and pit furnaces No. 7 and No. 8, with the necessary gas producers, pump house extensions and pumps, stock house extension and crane, transformer station, etc. Waste heat boilers were put up in connection with open-hearth furnaces Nos. 13 and 14. Two hot saws with the necessary tables and transfers were installed in the 40-in. blooming mill. Narrow-gage locomotives and 50 standard-gage gondola cars were added to the rolling stock equipment. A 2000-cu. ft. air compressor was installed, and a 300,000-gal. per hr. water softening plant for supplying softened water to the boilers of the open-hearth, Haselton, coke, tube, Bessemer and Brown-Bonnell works. Police headquarters and locker rooms were erected for the Haselton open-hearth boilers, and the river was dredged at the intakes. The company has under construction for 1919 a 40-in. blooming mill crane, an extension of 127 ft. to the slab yard runway, a roll shop with complete equipment, including cranes, a building for millwrights and electricians, a 15,000-hp. feed water heater and the installation of additional machine tools in the machine shop as well as an extension to the office building.

At its by-product coke works at Youngstown this company completed in 1918 a locomotive and quenching car repair shop and installed a drinking water system and added 50 hopper cars to its rolling stock equipment. Under construction for 1919 there is planned an enlargement of the coal storage bins, equipment for handling sulphate, a hoist for luting coal, a spillage coal elevator, individual stacks for boilers Nos. 4 and 5, Coxe stoker at boiler No. 6, as well as an addition to the office building.

At the company's Haselton blast furnaces at Youngstown, furnaces Nos. 1, 3 and 4 were relined, the inside dimensions of Nos. 3 and 4 having been increased. A brick shed, 60 x 250 ft., was erected and a slag crane with a Brosius single-line bucket was put in at furnace No. 4. The railroad equipment was increased by the addition of two Mogul standard-gage locomotives and one six-wheel switching locomotive. In 1919 the company will reline furnace No. 2 and increase its inside dimensions, changing it from a hand-filled to a skip-filled furnace and altering the bins and adding larries for handling material from the bins to the skip. Cast house cranes will be put in at furnaces Nos. 2 and 3. Blowing engines Nos. 11 and 12 will be installed complete with condensers, as well as a 1500 cu. ft. air compressor. Boiler house No. 4 will be equipped with four 1130-hp. stoker-fired boilers completed with forced and induced draft fans, economizers, coal and ash-handling equipment. Additional boiler feed and service pumping capacity will be provided.

At the company's tube works at Youngstown a new store house and a hospital and police station were completed, and there is under construction a ball conveyor at the 8 to 16-in. lap weld mill, a building for millwrights and electricians, and a air compressor house.

At the company's Hall blast furnace at Sharon, Pa., the furnace was relined during 1918 and three gas-fired boilers were added.

At the Hannah blast furnace at Youngstown the furnace was relined in 1918 and three gas-fired boilers installed.

At the company's Inland works at East Chicago, Ind., mill buildings for the 9 and 18-in. mills were erected as well as a new machine shop. Two Stirling boilers were installed. During 1919 a busheling mill roll and a squeezer crane will be put in.

At the company's Pioneer furnace at Birmingham, Ala., No. 3 blast furnace was relined and repaired and a brick shed was erected in 1918. In the coming year additions will be made to the boiler plant and a central power plant will be erected, as well as a water softening plant. An oil filtering system will be provided.

At the company's Indiana bolt works, Muncie, Ind., electric fire pumps were installed and a carpenter shop provided in 1918.

It is expected that the enlarging of the inside dimensions of blast furnaces Nos. 2, 3 and 4 at Haselton will result in an increased capacity of 7500 tons of pig iron per month. The additions to open-hearth furnaces Nos. 13 and 14 at the open-hearth plant at Youngstown should increase the capacity of this plant 7000 tons per month.

Crucible Steel Co. of America

The Crucible Steel Co. of America in the past year has begun work on new developments incurring the expenditure of several million dollars.

Atha works: Important extensions at the Atha Works, Harrison, N. J., were begun early in 1918 in order to increase the output of gun and engine forgings. These extensions are not yet fully completed and include an addition to the open-hearth and electric furnace building, an extension to the annealing building which was started two years ago and a new gas producer house. To take the places of the old pattern and tin shops at the same plant brick fireproof buildings are being constructed to house these departments. The main rolling mill building at the same plant has been replaced with a new steel structure which has been built without a single interior column, a new departure in engineering in a building of that size. Additional ground adjacent to the Atha Works has been acquired from the Pennsylvania Railroad so that shipments from the company's own docks on the Passaic River will be practicable.

Park works: At the Park works, Pittsburgh, work was begun on a new building to centralize the open-hearth furnaces, which hitherto have been distributed at various points throughout the plant.

Sanderson works: At the Sanderson works, Syracuse, N. Y., contracts were let for an entirely new mill building and store house, work on these buildings having been done in such a way as not to disrupt the rolling operations.

LaBelle works: Additional boilers and an entirely new method for handling coal at the river at LaBelle works, Allegheny, Pa., have been contracted for and these improvements will be completed in the spring of 1919.

No other new construction has been planned for 1919 by this company.

Pittsburgh Crucible Steel Co.

At the plant of the Pittsburgh Crucible Steel Co., Midland, Pa., work was begun several months ago on a new 600-ton blast furnace of the latest type of construction, which will give the company two blast furnaces at that plant, thus insuring sufficient pig iron output for its finishing capacity. The building of the blast furnace carried with it the necessity of adding a by-product coke plant, through which the company will secure coke, gas and tar fuel for its own use. The by-product plant is being installed by the H. Koppers Co. and consists of two blocks of oven, each unit having 50 ovens. A large heat-treating building with annealing and heat-treating furnaces and other necessary equipment is now being completed at the Midland plant.

Central Iron & Steel Co.

In 1918 the Central Iron & Steel Co. completed its sixth open-hearth furnace, this being the second furnace of 120 tons capacity. To accommodate this furnace the open-hearth building was extended 100 ft. on the charging side and 120 ft. on the pit side and the open-hearth gas producer building was extended 80 ft. Reconstruction of the four 60-ton open-hearth furnaces is under way in order to increase their capacity to 120 tons.

To accommodate the greater production at the open-hearth department the entire track system has been changed to make the open-hearth building accessible by rail from either end. In this connection it was necessary to bridge a creek for a distance of 160 ft., and to raise the gas mains of the 60-ton furnaces for track clearance.

The storage capacity of the scrap yard has been doubled by elevating the runway for the gantry cranes serving this yard. The gantry cranes are now running on top of concrete walls 7 ft. high and 680 ft. long. To meet the increased demand for steam the boiler capacity at the open-hearth has been nearly doubled.

A concrete tunnel 350 ft. long is about completed for efficient removal of ashes from the gas producers and boilers at the universal mill. By means of a skip hoist the ashes are elevated and dumped direct into railroad cars for transportation to the dump. Several producers are being added to the universal mill gas house to increase the mill's heating capacity. A steel runway has been provided for the stock yard of the 89 and 72-in. mills.

The pumping capacity of the plant has been increased and water softeners are being installed to furnish the different departments and boiler houses with suitable water in sufficient quantities. Several locomotives and automatic dump cars have been added to the rolling equipment.

An additional blowing engine and also grates for burning of river coal under the coal-fired boilers are among the improvements at the blast furnace.

Midvale Steel & Ordnance Co.

At this company's Cambria works, Johnstown, Pa., the following additional facilities were completed in 1918:

A 32-in. mill for rolling wheel blanks, the Slick car wheel plant proper, as well as the erection of the rolled wheel plant removed from the Nicetown works; also the installation of a 1300-ton mixer at Franklin plant, 30 additional by-product ovens, 150-ton capacity standard track scale at Franklin; motor driven hoist at Franklin mine No. 2; new manway for mine No. 2; mechanical door handling apparatus for No. 8 battery coke ovens; 250 70-ton steel hopper cars for coal and coke service; two 6000-kw. turbine electrical additions at Franklin power plant; the completion of the Saltsburg gas coal mining operation including tipple, machinery and tenements, additional dwellings for employees near Franklin plant.

The following improvements are in progress:

Three new blowing engines for Nos. 1 to 4 blast furnaces; new building for 40 and 48-in. blooming mill; replacement of Coopersdale pump house; rearrangement of ore bins at Nos. 1 to 4 blast furnaces; reservoir and circulating system at Franklin coke plant; new coke quencher car; a new ingot stripping plant; two new mine openings; the electrification of rolling mill mine; an air shaft at Elk run mine; 1500-ton gas coal bin at Franklin, relining No. 4 and No. 6 blast furnaces; new mine locomotive at No. 4 mine; building addition to boilers at rod and wire mill; 60 dwellings near wheel plant; boiler breeching at Nos. 5 and 6 blast furnace boiler house; 20 additional houses at Saltsburg; further additions at the Slick wheel plant, including a tire mill; and 10 houses near Franklin mines.

At the company's Coatesville works the acquisition of additional water facilities at Icedale, Pa., extension to No. 3 boiler house building at blast furnaces, new roof and improvements at No. 1 cast house, relining Nos. 1 and 2 blast furnaces, one 125-ton ladle crane at open-hearth No. 2, additional soaking pit at 40-in. blooming mill, one standard gage locomotive and 20 standard gage dump cars, improved toilet facilities throughout the works, extension to crane structure No. 2 mill yard and converter substation at viaduct works constitute the principal improvements.

The townsite and roadway improvements were continued throughout the year, additional dwellings were completed and adjacent acreage acquired for further extension of dwellings.

At Nicetown, Pa., the following additions and improvements were made:

A 5000-ft. electric driven air compressor; two 250-ton track scales; six static transformers for power and lighting; extension of powdered coal burning equipment; improvements in and alterations to six buildings to provide locker, toilet and lunch rooms for women employees; reconstruction of No. 9 open-hearth furnace, changing it from 20 tons to 50 tons capacity; the addition of two heat-treating and three annealing furnaces for the manufacture of minor caliber ordnance; the installation in the old rolled wheel plant of one new 2000-ton forging press, of two 500-ton forging presses removed from another shop, all with necessary forge and manipulator cranes and furnaces, and the rebuilding and installation of one 700-ton straightening press; the completion of the additions to machnie shops for the manufacture of minor caliber ordnance; the rearrangement of shops and installation of new tools for the manufacture of 16-in. 50 caliber Navy guns; one 50-ton locomotive, and one 15-ton locomotive crane and additional steel gondola cars for works service.

At Rosedale, near Johnstown, Pa., the company has just completed 60 by-product coke ovens and has in course of completion the necessary by-product equipment for same. An additional battery of 60 ovens is planned as an early extension to the above, with provisions for a further extension of 60 additional ovens.

Ludlum Steel Co.

The Ludlum Steel Co., Watervliet, N. Y., in 1918 installed one 12,000-lb. steam hammer with 72-in. stroke, with the necessary crane and gantry rigging; one vertical water-tube steam boiler, working off of waste gases from the heating furnaces, and two new heating furnaces to be used in conjunction with the new hammer. Electric motor drive, with falk gear, for the 10-in. mill, replacing one 800-hp. steam engine, has also been arranged. The steam boilers used for the steam engine will be coupled up to existing steam-hammer capacity and to three additional 1000-lb. and 1500-lb. steam hammers.

A new grinding room has been completed, and 24 grinders installed with another 12, making 36 in all, nearing completion. This grinding room will be used exclusively for grinding high-speed steel billets. It will be fitted up with runways and other labor-saving appliances for quick handling of heavy material.

There is also nearing completion two additional 6-ton electric furnaces with an additional 10-ton crane. The new furnaces will be the Ludlum Electric Furnace Co.'s product. The total installation of electric furnaces at the Ludlum Steel Co. is now three 10-ton furnaces, three 5-ton furnaces, and two 6-ton furnaces, all Ludlum type.

A new annealing shop has just been completed containing six 15-ton annealing furnaces, and preparations are being made for the installing of two more of the same type of oil-burning furnaces. A large, light, saw-tooth inspection building has been finished and fitted up with labor-saving appliances, cranes, and a number of power hack saws, having a floor space of over half an acre.

These new improvements which have now been completed will increase the company's output by more than 50 per cent. The output since this time last year has increased over 100 per cent.

Taylor-Wharton Iron & Steel Co.

In 1918, at its High Bridge, N. J., plant the Taylor-Wharton Iron & Steel Co. added a 3-ton Bessemer converter and a 3-ton electric furnace, increasing its steel-making capacity over 100 per cent. About 85 per cent of the company's output was devoted to Government uses.

At its Easton, Pa., plant, William Wharton, Jr., & Co., Inc., the company added a 6-ton electric furnace to its steel foundry department, increasing the capacity 100 per cent. In its forge department large additions were made by the Government to facilitate the production of shell forgings, the output of this department being devoted almost exclusively to war work.

At one of its Philadelphia plants, the Philadelphia Roll & Machine Co., it added and put in operation late in 1918 a 25-ton open-hearth furnace and a two-ton side-blown converter in the steel foundry department.

At its other Philadelphia plant, the Tioga Steel & Iron Co., the company built an entirely new and separate plant for the use of the Government adjoining its old plant for the production of 4-in. naval gun forgings. It consists of a large forging shop with forging presses and heat-treating apparatus and a machine shop for the rough turning and boxing of the gun forgings. With the ending of the war the use to which this plant will be put is stated to still remain uncertain.

Wickwire Steel Co.

The Wickwire Steel Co., Buffalo, in 1918 installed and put in operation an 18-in. 6-stand continuous billet mill, a continuous rod bundle conveyor, an extension to its docks of approximately 80 ft., as well as the erection of a Wellman-Seaver-Morgan fast plant unloading machine on the dock. A new pumping unit having a capacity of 100,000,000 gal. in 24 hr. was installed as well as an additional 5-ton bridge on the ore stocking yard. Two dolomite burners were added as well as an overhead traveling crane for stocking and loading rods.

In its wire mill the company has installed additional bake ovens, pot annealers and wire drawing blocks, two patenting furnaces, a new shipping room building and six straightening and cutting machines. In the nail mills there have been added installations for cement coating, galvanizing, tinning and japanning. In the company's assembling yards a large 350-ft. span gantry crane has been put up, a pure drinking water system installed, a number of company dwelling houses built, as well as additions to the equipment of the machine shops.

Steel & Tube Co. of America

Except for its pipe mills, consisting of one butt and two lap-weld mills, the Steel & Tube Co. of America has practically all of its new steel plant at East Chicago in operation. The pipe mills are expected to begin operations in January, 1919. There was completed and placed in operation in 1918 four 90-ton open-hearth furnaces, a 35-in. two-high reversing blooming mill and a 30-in. universal plate mill, with all accessory equipment. A billet mill and a skelp mill went into operation in 1917. A blast furnace was completed and blown in in the year. The entire mill is electrically driven. Provision has been made for various extensions when the need arises. Adjoining the plant a battery of 120 by-product coke ovens is being completed. The Iroquois Iron Co., South Chicago, which later merged with the Steel & Tube Co. of America, blew in a new 600-ton stack March 5, which had been less than a year in building. With its construction there was a general overhauling and improvement of the Iroquois plant, which was done without interrupting the operations of the other furnaces.

The Mark plant of the Steel & Tube Co. of America, East Chicago, Ind., put into blast a new 600-ton furnace Aug. 24, in most respects similar to the new one at the Iroquois plant.

Tacony Ordnance Corporation

The entire plant of the Tacony Ordnance Corporation, Tacony, Philadelphia, was constructed during 1918 for the purpose of manufacturing large caliber gun forgings for the United States Government. The plant consists of an open-hearth department containing two 40-ton acid oil-burning furnaces, an ample stock yard, forge department with a 2000-ton steam hydraulic press, and a 1000-ton steam hydraulic press, annealing furnaces, heat treating equipment and a large machine shop for the rough turning and rough boring of the heavy forgings. In addition, the plant has a well-equipped microscopic, chemical and physical laboratory, an emergency hospital, restaurant, administration buildings and other service structures.

There is now in course of construction a four-bay extension (72 ft.) to the machine shop. This should be completed early in 1919.

The open-hearth department has a capacity of 3500 tons of steel per month.

Lukens Steel Co.

During 1918 the Lukens Steel Co., Coatesville, Pa., completed and put in operation six 100-ton open-hearth furnaces, and during 1919 will complete and put in operation two more 100-ton open-hearth furnaces, bringing the total furnaces of this company to 24. In the past year the company completed and put in operation its 204-in. plate mill, the largest in the world.

The company has purchased near New Castle, Del., a large tract of land, having a frontage on the Delaware River extending one mile. The purposes to which this tract will be put have not yet been announced.

John A. Roebling's Sons Co.

The John A. Roebling's Sons Co., Trenton, N. J., at its Kinkora works, Roebling, N. J., completed an ex-

tension to its wire mill No. 2, together with the necessary equipment and added additional machinery to wire mill No. 3. Many labor-saving devices were added to all departments and facilities for the economical handling of coal and fuel oil were provided.

At the company's Trenton plant in 1918 there was completed what is known as the Elmer Street and Clark Street rope shops, and additional machinery was installed in the Hancock Street rope shop.

In 1919 the company has under construction for completion in that year two additional open-hearth furnaces and a blooming mill at its plant at Roebling. The mill is intended to replace the present mill and provide increased capacity.

Inland Steel Co.

The Inland Steel Co., Chicago, has not added any new units, but has done considerable development work, including the following:

700-ton mixer and mixer building.
One additional blowing engine.
Extension of blowing engine building.
Addition to 40-ft. blooming mill billet dock.
New chemical and physical laboratory.
Extension to ore yard docks and piers.
Extension to 90-in. plate mill, including finishing end and slab yard.
New car repair shop.
New dormitory and dining room.
Superheaters in 14 blast-furnace boilers.
New storeroom for coke plant.
Additional locomotives.
Additional locomotive cranes.
Additional traveling cranes.
250 steel cars for work's movements.

The company has new finishing mills in contemplation, but it is improbable that immediate action will be taken toward contracting for any of them under present conditions.

Halcomb Steel Co.

The Halcomb Steel Co., Syracuse, N. Y., installed in 1918 four new bar annealing furnaces and two wire annealing furnaces as well as two 6-drum frames for cold drawing and two 15-frame wire drawing machines. Two additional Smith gas producers have been provided and a new pickling and chipping department for billet inspection. There was put in operation two Greaves-Etchells electric furnaces of 3 gross tons capacity each. In 1919 the company will complete the erection of a new 5-ton hammer with heating furnaces. It is also remodeling its boiler house with the addition of one new 600-hp. boiler. There is also under construction two Smith gas producer units and a coal trestle.

United Steel Co.

United Steel Co., Everett, Wash., is building a new steel plant in which it is erecting a 5-stand bar mill electrically driven. The building for the machinery has been completed as well as the office building and the machinery is being installed. A 4-door pre-heating furnace has been provided and a 25,000 gal. concrete tank for oil storage. Some time in 1919 the company will erect a 25-ton open-hearth furnace.

Penn-Seaboard Steel Corporation

The Penn-Seaboard Steel Corporation, Philadelphia, in 1918 completed the reconstruction of its steel casting plant at New Castle, Del., converting it into a rolling mill having a capacity of 70,000 tons of steel plates per year. There was no increase in the open-hearth capacity. The rolling mill consists of a two-high reversing electrically driven 84-in. plate mill. The company's plant at New Haven Conn., has a capacity of 30,000 tons of steel ingots, the output of this plant having formerly been steel castings and shell ingots.

Atlantic Steel Co.

Atlantic Steel Co., Atlanta, Ga., in 1918 installed a 10-in. motor driven hoop and cotton tie mill having a capacity of about 25,000 tons per year. Before this mill was installed this capacity was sold as billets. In 1919 the company contemplates the addition of a 50-ton basic open-hearth furnace having a capacity of 30,000 tons of ingots per year. This will increase the open-hearth capacity about 33 per cent.

Whitaker-Glessner Co.

The Whitaker-Glessner Co., Wheeling, W. Va., did not complete any new capacity during 1918, but still has under construction a new sheet mill plant consisting of eight hot mills at Beech Bottom, W. Va. Work on this plant was begun in 1917 and will be completed in the early part of 1919.

Apollo Steel Co.

The Apollo Steel Co., Apollo, Pa., has under construction two new 30-in. sheet mills which it expects to have in operation not later than April 1, 1919. No other new construction is planned for 1919. The two additional rolling mills will give this company a total of eight hot mills and two cold mills in one continuous line, all driven by a large motor-controlled gear.

Utah Iron & Steel Co.

About Dec. 1 the Utah Iron & Steel Co., Salt Lake City, Utah, completed its No. 2 50-ton basic open-hearth furnace which went into operation about Dec. 15. In the year the company has made minor improvements enabling the more economical handling of output, and in the next two or three months expects to install a continuous oil-fired billet-heating furnace to take the place of two four-door coal-fired heating furnaces. Also it expects to install a motor-driven 9 or 10-in. merchant mill in the first half of 1919, thereby obtaining an increase in rolling capacity and range of sizes.

Canton Sheet Steel Co.

The Canton Sheet Steel Co., Canton, Ohio, largely increased its open-hearth capacity during the year. One of its three 30-ton open-hearth furnaces was torn down and replaced with a 90-ton furnace and an additional 90-ton furnace was built. The two old 30-ton furnaces that remain will probably be replaced with 90-ton furnaces during the year, increasing the plant's capacity to 150,000 tons. This company, which now has a 3-high continued sheet bar and billet mill for rolling sheet bars, billets and slabs for supplying its sheet mill department, will shortly install an 18-in. bar mill, contracts for the building equipment having recently been placed. The bulk of the product from this mill will be consumed by the Cleveland Welding & Mfg. Co., Cleveland, an allied interest.

Wayne Steel Co.

The Wayne Steel Co., Erie, Pa., has placed contracts for the erection of a new steel plant. This will include two 25-ton open-hearth furnaces and gas producer equipment. This company is affiliated with the U. S. Horse Shoe Co., Erie, which will consume a portion of its product.

McKinney Steel Co.

The McKinney Steel Co., Cleveland, is erecting two additional open-hearth furnaces which it expects to have ready for operation in the spring. These will be of 100-ton capacity and when built the company will have 14 open-hearth furnaces.

Erie Forge Co.

The Erie Forge Co., Erie, Pa., completed early in the year a new open-hearth plant with two open-hearth furnaces and in connection with it erected a forge shop and machine shop. This plant is being operated as a separate unit under the name of the Erie Forge & Steel Co., and is engaged on Government work for the Navy Department.

(*Continued on page* 89)

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Concerning "The Iron Age"

In the first issue of 1916, in comment on the sixtieth anniversary of THE IRON AGE, it was said that the prestige of this journal was as much due to the splendid constituency that had read it and had faith in it through three score years as to those who had been directly responsible for its conduct. With no assumed modesty concerning the part THE IRON AGE has borne in building up the great industries it represents, we say without reserve that this has been in large measure a reflex of the character and the genius of the men who have made those industries what they are. The same thought is evidently in the minds of those who have the habit of calling THE IRON AGE an institution.

The present Annual Review Number is a fresh illustration of what was pointed out three years ago. To be more specific, we know of no other issue of a technical or business journal, or of any periodical in whatever field, of which it could be said that no advertiser had been specially solicited to take space in it.

Four months ago, when ordinarily plans for the first issue of 1919 would have been set in motion, the country was at war. THE IRON AGE had freely given its pledge to the Fuel Administration to restrict to the largest degree possible its use of white paper. In keeping with the spirit of that pledge, it was decided that no effort would be made to increase the number of advertising pages in this issue over and above the space called for by the contracts of regular advertisers. Not only was there no solicitation of firms not regularly advertising in the paper, but, departing from the custom of years, there was no solicitation of contract advertisers to enlarge their usual spaces. But for the adoption of that policy, the size of this issue easily could have been increased by 250 to 300 pages.

The point we would make is that this issue of THE IRON AGE, larger with but one exception than any that has preceded it, is more an expression of the eminence and incomparable vitality of the iron and steel and metal-working trades than of any calculated effort of the publishers to make a prodigious number and establish a new record. We are well aware that the size of THE IRON AGE has been a matter of widespread comment, most of it friendly and appreciative. In the midst of the war the suggestion came that a publication of such physical proportions was too great a consumer of paper. But that criticism entirely overlooked the fact that a specialized journal may effectively and fully cover a field and yet use but a fraction of the paper required for a city daily—the numerical comparison being represented by 16,500 to 17,000 copies on the one hand and by several hundred thousand on the other.

Great industries demand a great paper. That in a nutshell is the situation as to the size and prestige of THE IRON AGE. From a small beginning it has grown, as the output of iron and steel and of all their widely ramifying products has grown. The development has been a typically American one, in which THE IRON AGE and its thousands of friends have a right to take pride. As the paper goes out week after week to every corner of the earth, we submit that it is an impressive exhibit of the strength and enterprise of the American iron industry and of the hundreds of industries based upon American iron and steel. Not only so, but for many years it has been an integral part of the American propaganda for the sale of iron and steel and of metal-working machinery in the markets of the world.

In all the 63 years, the founder of this journal and those who in succession have maintained his ideals have put the interests of their readers foremost. If advertisers have steadily multiplied—more than 1950 being on the list to-day—it is because they have found that the best served readers in any industrial field are the ones whom it is most desirable to reach. THE IRON AGE has no entangling alliances with any group of interests, either producers of iron and steel or manufacturing consumers. Its editorial independence is an honorable tradition, as is its impartial handling of market questions involving sellers and producers on the one hand, and on the other hand buyers and manufacturing consumers. Its unvarying aim has been to serve to its full power, without bias or favor, the whole army of American makers and users of the world's basic metals. The confidence it has had in return has been a challenge to greater effort and a constant spur to enthusiasm and enterprise.

Steel Trade Prospects

Never—and we need not except the months of depression and confusion following the German invasion of Belgium—has writing of the future of business been so difficult. So much is to be said, yet there is so little basis for prophecy. In the main the utterances of leaders in finance and industry are hopeful, though the favorable expressions are often qualified by references to a period of uncertainty before the coming of the new prosperity.

There are those also—and their competence to appraise economic facts is not doubted—who believe that the transition from war to stable peace conditions will require no little time and will be accompanied by depression and unemployment. Their position in brief is that the period of war inflation must be followed by one of deflation; that a general fall in prices is ahead, including the price of labor, and that such readjustment has always involved industrial and financial disturbance.

The prospects of the steel industry are no more uncertain than those of other industries, or of business in general. Steel enters so generally into industrial life that it never has a prosperity all its own and is never denied prosperity when business as a whole is active. The next period of prosperity for the iron and steel industry will be a period of general prosperity and the only question is as to when that will come.

Since the prolonged industrial depression of the eighteen-nineties the iron and steel industry has had six "buying movements" or periods of activity, each one very clearly marked, and represented by the years 1899, 1902, 1906, 1909, 1912 and 1915. Between times there have been periods of relative depression of greater or less intensity. More or less in all these cases buyers were merely awaiting a stimulus. Steel is normally purchased for forward delivery. The investor must necessarily buy far ahead and the jobbers and manufacturing consumers have fallen into the habit. Rising prices encourage forward buying and in all buying movements in the steel trade rising prices have been an accompaniment. In each case extensive buying has ceased soon after prices stopped advancing. In the five lulls in the steel trade since 1899 there was little in general business that required readjustment.

At the present time, on the contrary, a great deal needs readjustment and there is a great deal for business to wait for. Now that the whole world is being made over, commerce must await the completion of the job before it can develop. Just how much freedom in trade there will be remains to be seen. Labor conditions in each country must be established, and not simply as to rates of wages but also as to the amount of labor to be expected in return for the wages.

For the steel industry it is unfortunate that two great industries which under somewhat different circumstances would be liberal buyers, are not largely in the market at the present time—shipbuilding and the railroads. During the late months of the war there was a large accumulation of steel and the stocks must be eliminated before the demand for ship steel is equal to the current rate of consumption. As to the railroads, they are in practically nobody's hands to-day. The Railroad Administration cannot develop a general scheme of rehabilitation and extension, nor can the individual railroad companies. The decision as to whose job this will be is in the hands of Congress.

It has become a dictum lately that prosperity follows war. The principle would be more correctly stated if the word activity were used instead of prosperity. Our experience after the Civil War is frequently cited. There was great activity and prices stayed up. For instance, it was not until 1876 that pig iron dropped as low as the pre-war average. This statement, however, proves altogether too much, for there was a terrific panic in September, 1873, and even it did not bring prices down to the pre-war level. All the records, of prices, production, bank clearings and similar trade indices testified to there being great commercial and industrial activity for eight years after the Civil War. This is not enough. The question must be asked whether that activity represented the advancement and progress which must come with real prosperity. There are no satisfactory statistics to show what men actually had after working so hard for those eight years, but some information has been handed down, and it is distinctly unfavorable. When the depression came it was found that few men had any real wealth. The real readjustment came in the depression that ran from the panic of September 19, 1873, to the latter part of 1879. In the retrospect, it does not seem unreasonable to assert that it would have been better if more of the readjustment had been made before the eight years of activity.

If this experience counts for anything, it suggests that the world is soon to enter upon a period of great activity, but what will be the final outcome depends upon the character of the activity.

Trade with Europe

After-war co-operation with the United States is desired by both Great Britain and France. The British have no fear of their keeping a strong hold on foreign trade; in fact they appear to believe there is enough business for all, but they deplore the possibility of ruinous competition if there are no international understandings. France is desirous especially of increasing her trade with the United States. It is probably accurate to say that the industrial leaders of all the nations associated in the Allied war efforts would like to see established conditions which will allow for international interdependence as distinguished from national independence.

National self-interest must necessarily be considered in the peace conferences but it does not seem likely that commerce will receive anything but general analysis at the Paris meeting. The economists will attempt to settle national relations on broad lines and in this fact may be found the key to long peace. The shortened perspective of the business expert of dominating power might,

if he were allowed to exert his influence in formulating the peace terms, bring about local advantage which would too quickly disturb free or reasonable international trade. The temper of the nations is for maintaining world relations. Their peoples, while the sacrifices of the war are still a vibrant memory, are not willing to pursue unrelentingly a purely selfish motive, but demand a stop somewhat short of it if by so doing they help rear a world commercial structure of stability.

Both Britain and France have serious labor problems. The fear of unemployment and thus the spread of Bolshevism is the bête noir. High wages in the United Kingdom are of less concern than the return to the former restriction of output. Volumes of literature intended to reach the wage earner have appeared, to prove that production is the absolute necessity of the industries and to carry the conviction that high production must be realized if high wages are to remain. To supplement the literature, a movement is under way to have workmen visit the United States, as this country is held up as the home of big wages, but also of high output per worker.

Although the signs are that reconstruction of the devastated regions of France and Belgium will go on slowly (at least until plans and the finances are arranged) and that the world in general is hesitating to embark on purchases at war prices, enterprises abroad under government control have taken the initiative in the attempt to get the wheels of peace industries turning. If these efforts make any impression, the demands of the world held up by the war will reappear and a period of business of large volume will result. Whether the financing of projects to conquer hitherto undeveloped regions, notably Mesopotamia (and incidental transcontinental railroads), and from time to time parts of the tropics which only need the hand of man to make them fully livable—whether these movements will take place before liquidation sets in to compensate for the four and one-quarter years of concentration on the manufacture of engines of warfare and of waste of human energy and life, is for the future to determine. The recession of costs will be too slow to keep back general buying; and while the nations are heavily in debt, the people have per capita more money than ever before, albeit it has a diminished purchasing value. On the whole, conditions are generally favorable to a period of activity and there are only sporadic cases of that over-expansion which has so commonly brought on business setbacks.

To pursue the suggestion of international interdependence further: the idea is that just as there is commerce among our several States, each with its own particular industrial laws, we should rightly foster a broadened commerce among the nations. The product of one State competes successfully with a like product made or produced within a second State. The one country which has gained an enviable reputation for some products and wishes to establish it for others, must make the effort to secure a foothold in the foreign country. This is the wish of our own manufacturers in foreign trade and the rule ought to work both ways. Advertising in its broadest aspect will undoubtedly be conspicuous in the coming regime, and the interchange of natural and manufactured products must necessarily result. A creditor nation cannot also remain exclusively a seller to the world unless it never expects to have the debts paid.

The Government's Machine Tools

That the problem of disposing of the machine tools owned by the Government so as not to demoralize that important industry is a serious one cannot be doubted. This was brought out in an editorial published in THE IRON AGE of Dec. 19 and in numerous news articles, but in view of recent action at Washington it seems to us that some of the machine tool manufacturers are taking a gloomy view which is not justified. For example, A. W. Whitcomb of the Worcester Lathe Co., Worcester, Mass., writes to THE IRON AGE in part as follows:

> The machine tool business of this country, I believe, cannot possibly thrive again within the next ten years if the Government undertakes to sell or to give any considerable part of its $200,000,000 worth of standard machine tools to other users within the same period. Even barring this unhappy contingency, the industry must inevitably languish for the next few years while its present swollen proportions are shrinking back to normal, while the thousands of privately owned metal-working machines made for war uses are being redistributed, while prices are falling to find a firm level and while the whole world is trying to adjust itself to new and strange economic conditions. Unless, then, it is an industry that really deserves extinction, it should certainly not now have unnecessary difficulties thrown in its way, least of all the difficulty of governmental competition.

Continuing, Mr. Whitcomb says that he does not think the machine tool producers should be penalized on account of the quick coming of peace, and he inquires, "Why should not the Government keep all of the machine tools it bought for the war, keep them as it will have to keep the guns, the ammunition, the airplane parts, and the millions of other things it purchased and now cannot use?"

It strikes us that the proposition not to allow anyone to use the Government's machine tools is akin to the plan to sink the German battleships because that seemed to be the easiest way of disposing of a difficult problem. There has been enough waste and the world should find use for every useful thing that is in existence. It is fortunate that the President has requested Benedict Crowell, Assistant Secretary of War, to assume responsibility for the proper disposition of all property acquired by the War Department since April 6, 1917. Mr. Crowell is a business man who has served with marked efficiency during the period of the war and has announced that the Government does not intend to compete with private firms or companies in the disposition of material on hand, but that the machine tool manufacturers will be asked to handle the Government-owned machine tools with their own output on a basis of 20 per cent of each company's sales. It also is pointed out that the Government may use a part of its supply of machine tools to help in the rehabilitation of destroyed industries of Belgium and Northern France. With Secretary

Crowell manifesting this spirit of fairness, it seems entirely probable that the problem will be successfully worked out and that the machine tool industry in time will readjust itself just as satisfactorily as will other leading industries of the country. No one who has confidence in this country will doubt that this will be done by all industries which have succeeded in the past, although there may be a period of trying experiences for many of them.

Fertilizing Piece-Work Production

A New England manufacturer has in his factory a piece-work proposition on which the men employed earned on an average about $3 per day. The war reduced the force and the employer found it increasingly difficult and ultimately impossible to obtain a sufficient supply of men. Women have now been satisfactorily trained to do this class of work in the plant. Their diligence has made that $3 job worth $5 apiece to them every day. A visitor to the factory recently observed that according to the record of the operations performed now and formerly, three women were equal to five men! Even more interesting is the speculation as to what will be said should the men come back for their old places. And if they get them, what then?

Red Cross Institute for Blind Progressing

In its work of laying the foundation for the placing of blind soldiers where they can perform functions useful to industry and profitable to themselves, the Red Cross Institute for the Blind is doing a work which may result in the establishment of employment of all sightless persons. Lieut-Col. James Bordley, is director of the Institute, and a great deal of the planning is being done by A. B. Segur, industrial engineer. Conway Building, Chicago.

Wherever it is believed blind men can be employed, careful surveys of the work in mind are made, this including the making of micro motion pictures which enable operations to be easily studied, making possible determinations which cannot be made by watching a man work in the ordinary way. When the pictures are slowed down so they may be leisurely studied, false and useless movements become apparent. Moving pictures of core-making have been made in the foundries of the International Harvester Co. and the Crane Co., both in Chicago. The main object of the close study is not only to create a place for the blind man, but to so train him and so systematize the work, if necessary employing special machinery or devices, that he can produce on a production basis, thereby not only making a good wage for himself, but producing at a rate that insures his retention and the satisfaction of the employer.

In a factory making small power transmission chain, no less than 35 to 40 different types of jobs have been determined as suitable to the trained blind man. In a factory manufacturing speedometers, about 200 suitable kinds of work were found. Blind men, or women, are particularly adaptable for the assembly of interchangeable parts.

Mr. Segur is confident that within six months after the surveys are completed, each industry being studied separately at one or two representative plants, there will be work for every blind man who wants to work. Surveys of several industries will be completed within 30 days. The studies are most exhaustive, taking into consideration every requirement, physical and mental, of every position. The work in most cases will solve the problem of employment for maimed soldiers as well as for those who have lost their sight.

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National Car Coupler Co. Contests Authority of War Labor Board

The National Car Coupler Co., Attica, Ind., has contested the authority of the National War Labor Board to establish an 8-hr. day in the company's plant and has issued a statement announcing its refusal to abide by the board's decision.

J. W. Harrison, president and general manager, in his statement, says that the plant has been for 20 years operated on the open-shop principle. During all of that time it never had a strike, and such difficulties with employees as came about were always satisfactorily adjusted. He asserts that efforts were made by union organizers to force the company to accept the union shop policy. He states that a labor representative appeared and employees were set to work in the factory agitating the unionizing of the men. This propaganda, he declares, was carried on during working hours at the expense of the company, so that it became necessary to discharge 33 men, 21 of whom later voluntarily returned to work. A strike was called, but 750 men refused to go out. The agitators presented their case to the National War Labor Board, which conducted a court of inquiry and made an award which required the reinstatement of the men discharged, ordered the inauguration of the collective bargaining policy and established a basic 8-hr. day.

Meanwhile, it is stated, a petition signed by 93 per cent of the employees was presented to the company asking that they be permitted to remain at work on the old basis, and waiving any rights they might have under the War Labor Board decision. Information as to this petition was conveyed to the War Labor Board, which refused to change its award.

The National Car Coupler Co. maintains that when there is no war the National War Labor Board has no jurisdiction, and therefore refuses to abide by the board's decision.

Increasing Production of By-Product Coke

Total of 9940 Ovens in Operation at End of 1918—Production of By-Product Coke Will This Year Exceed That of Beehive Ovens

DURING 1918 there were completed and placed in operation in the United States and Canada 2445 by-product coke ovens, making a total of 9940 in operation at the close of the year. By-product coke-making capacity is now in excess of beehive capacity. There are now under construction 14 new by-product coke plants, with a total of 1620 ovens, which will be completed during 1919.

The by-product coke plants now in operation have a rated capacity totalling about 36,840,200 tons of coke a year, with a coal consumption of approximately 50,000,000 tons annually. This is rated capacity and may not be equalled by actual output, but the 1919 output, with the new plants coming in during the year, will probably be about 30,000,000 tons or more of coke. The new ovens under construction have a total coke capacity of 7,590,000 tons annually.

In 1919 the production of by-product coke will probably exceed that of beehive coke for the first year in the history of the industry. The estimate of the U. S. Geological Survey of by-product coke

BY-PRODUCT COKE PLANTS IN OPERATION IN THE UNITED STATES AND CANADA, JAN. 1, 1919

Owner or Operator—Location	No. of Ovens	*Kind of Ovens*	Annual Capacity, Net Tons	
			Coal	Coke
Solvay Process Co., Syracuse, N. Y.	40	Semet-Solvay	65,000	45,500
Allegheny By-Product Coke Co., Glassport, Pa.	120	Otto	260,000	195,000
Cambria Steel Co., Johnstown, Pa.	462	343 Otto, 92 Koppers, 27 Gas Mach.	1,530,000	1,224,000
Carnegie Steel Co., Farrell, Pa.	212	Otto	830,000	581,000
Semet-Solvay Co., Dunbar, Pa.	110	Semet-Solvay	248,000	173,000
Lehigh Coke Co., South Bethlehem, Pa.	424	Koppers	2,400,000	1,920,000
Bethlehem Steel Co., Lebanon, Pa.	318	228 Otto, 90 Semet-Solvay	887,000	638,000
Bethlehem Steel Co., Steelton, Pa.	120	Semet-Solvay	516,000	371,500
Philadelphia Suburban Gas & Electric Co., Chester, Pa.	40	Semet-Solvay	125,000	87,500
Camden Coke Co., Camden, N. J.	150	Otto	360,000	252,000
Empire Coke Co., Geneva, N. Y.	46	Semet-Solvay	146,000	102,200
Lackawanna Steel Co., Buffalo, N. Y.	469	188 Otto, 281 Rothberg	1,350,000	972,000
New England Gas & Coke Co., Everett, Mass.	400	Otto	650,000	455,000
Bethlehem Steel Co., Sparrows Point, Md.	360	Koppers	2,190,000	1,576,800
National Tube Co., Benwood, W. Va.	120	Semet-Solvay	270,000	189,000
Laclede Gas Light Co., St. Louis	56	Koppers	320,000	240,000
Zenith Furnace Co., Duluth	65	Otto	160,000	112,000
Cleveland Furnace Co., Cleveland	100	Semet-Solvay	450,000	337,500
Republic Iron & Steel Co., Youngstown	134	Koppers	1,020,000	744,600
Youngstown Sheet & Tube Co., Youngstown	306	Koppers	2,050,000	1,425,000
Toledo Furnace Co., Toledo, Ohio	94	Koppers	560,000	408,800
United Furnace Co., Canton, Ohio	47	Koppers	280,000	204,400
Hamilton Otto Coke Co., Hamilton, Ohio	100	Otto	240,000	168,000
Milwaukee Coke & Gas Co., Milwaukee	160	Semet-Solvay	1,000,000	750,000
Northwestern Iron Co., Mayville, Wis.	72	Otto	320,000	230,400
Citizens Gas (1), Indianapolis	41	Semet-Solvay	250,000	185,000
Citizens Gas (2), Indianapolis	100	Otto	320,000	230,400
Illinois Steel Co., Gary, Ind.	700	Koppers	4,400,000	3,480,000
Central Indiana Gas Co., Muncie, Ind.	22	Klonne	40,000	28,000
Inland Steel Co., Indiana Harbor, Ind.	130	Koppers	890,000	666,800
By-Products Coke Corporation, South Chicago, Ill.	280	Semet-Solvay	1,300,000	975,000
North Shore Gas Co., Waukegan, Ill.	13	Semet-Solvay	55,000	38,500
Coal Products Mfg. Co., Joliet, Ill.	53	35 Koppers, 18 Wilputte	340,000	238,000
Illinois Steel Co., Joliet, Ill.	280	Koppers	1,500,000	1,200,000
Semet-Solvay Co., Detroit	215	Semet-Solvay	1,343,000	1,009,000
Michigan Alkali, Wyandotte, Mich.	30	Otto	94,000	65,800
Kentucky Solvay Coke Co., Ashland, Ky.	108	Semet-Solvay	800,000	600,000
Woodward Iron Co., Woodward, Ala.	230	170 Koppers, 60 Wilputte	1,330,000	997,200
Tennessee Coal, Iron & R. R. Co., Fairfield, Ala.	280	Koppers	1,650,000	1,254,000
Semet-Solvay Co., Ensley, Ala.	240	Semet-Solvay	760,000	530,000
Central Iron & Coal Co., Holt, Ala.	60	Semet-Solvay	290,000	220,400
River Furnace Co., Cleveland	204	Koppers	1,300,000	960,000
La Belle Iron Works, Steubenville, Ohio	94	Koppers	610,000	445,000
Brier Hill Steel Co., Youngstown	84	Koppers	520,000	379,000
Semet-Solvay Co., Buffalo	60	Semet-Solvay	386,000	289,500
Gulf States Steel Co., Gadsden, Ala.	37	Koppers	237,000	175,000
Seaboard By-Product Coke Co., Jersey City, N. J.	165	Koppers	1,200,000	900,000
Portsmouth Solvay Co., Portsmouth, Ohio	108	Semet-Solvay	770,000	559,000
Algoma Steel Co., Ltd., Sault Ste. Marie, Ont.	160	110 Koppers, 50 Wilputte	892,000	600,000
Indiana Coke & Gas Co., Terre Haute, Ind.	60	30 Gas Mach., 30 Koppers	292,000	205,000
Minnesota By-Product Coke Co., St. Paul	65	Koppers	400,000	300,000
Carnegie Steel Co., Clairton, Pa.	640	Koppers	4,000,000	2,800,000
Bethlehem Steel Co., Steelton, Pa.	60	Koppers	360,000	250,000
Colorado Fuel & Iron Co., Pueblo, Col.	120	Koppers	720,000	550,000
Chattanooga Coke & Gas Co., Chattanooga, Tenn.	24	Semet-Solvay	175,000	125,000
National Tube Co., Lorain, Ohio	208	Koppers	1,200,000	850,000
Dominion Iron & Steel Co., Sydney, Nova Scotia	120	Koppers	720,000	500,000
Steel Company of Canada, Hamilton, Ont.	80	Wilputte	505,000	329,000
Ironton Solvay Coke Co., Ironton, Ohio	60	Semet-Solvay	432,000	311,000
American Steel & Wire Co., Cleveland	180	Koppers	1,080,000	750,000
Dover By-Product Co., Dover, Ohio	24	Roberts	144,000	100,000
Providence Gas Co., Providence, R. I.	40	Koppers	240,000	165,000
Citizens Gas Co., Indianapolis	40	Wilputte	252,000	176,400
Total	9,940		50,024,000	36,840,200
Plants Under Construction Jan. 1, 1919				
Sloss Sheffield Steel & Iron Co., Birmingham, Ala.	120	Semet-Solvay	864,000	622,000
Domestic Coke Corporation, Cleveland	60	Semet-Solvay	432,000	311,000
Ford Motor Co., Detroit	120	Semet-Solvay	864,000	622,000
Jones & Laughlin Steel Co., Pittsburgh	300	Koppers	2,000,000	1,300,000
Carnegie Steel Co., Clairton, Pa.	128	Koppers	800,000	560,000
Tennessee Coal, Iron & R. R. Co., Fairfield, Ala.	154	Koppers	910,000	690,000
Rainey-Wood Coke Co., Swedeland, Pa.	110	Koppers	800,000	600,000
Donner Union Coke Co., Buffalo	150	Koppers	1,000,000	650,000
Birmingham Coke & By-Products Co., Birmingham	50	Koppers	335,000	235,000
Domestic Coke Corporation, Fairmont, W. Va.	60	Koppers	400,000	260,000
Pittsburgh Crucible Steel Co., Midland, Pa.	100	Koppers	667,000	435,000
Wisconsin Steel Co., South Chicago, Ill.	88	Wilputte	578,000	376,000
By-Product Coke Corporation, Indiana Harbor, Ind.	120	Semet-Solvay	864,000	622,000
Lackawanna Steel Co., Buffalo	60	Semet-Solvay	438,000	307,000
Total	1,620		10,952,000	7,590,000

production from Jan. 1 to Dec. 7, 1918, is 24,238,059 tons, while beehive coke output in the same period is estimated at 28,798,876 tons.

Already leading factors in the coke trade see the eventual substitution of by-product coke for beehive. During the past year the H. C. Frick Coke Co. has been blowing out a large number of beehive ovens in the Connellsville region to supply coal to the by-product coke plants of the United States Steel Corporation. Another large independent coke interest is gradually transferring its investments from beehive coke to by-product coke production.

Coke Produced in the United States, 1880 to 1918 (Partly from Mineral Resources of the U. S. Part II, p. 523, Year 1915)

Year	By-Product Coke Quantity (Net Tons)	By-Product Coke Percentage to Total	Beehive Coke Quantity (Net Tons)	Beehive Coke Percentage to Total	Quantity (Net Tons)
1880.....	.....	....	3,338,300	100.0	3,338,300
1885.....	.....	....	5,106,696	100.0	5,106,696
1890.....	.....	....	11,508,021	100.0	11,508,021
1893.....	12,850	0.1	9,464,730	99.9	9,477,580
1900.....	1,075,727	5.2	19,457,621	94.8	20,533,348
1905.....	3,462,348	10.7	28,768,781	89.3	32,231,129
1910.....	7,138,734	17.1	34,570,076	82.9	41,708,810
1911.....	7,847,845	22.1	27,703,644	77.9	35,551,489
1912.....	11,115,164	25.3	32,868,435	74.7	43,983,599
1913.....	12,714,700	27.5	33,584,830	72.5	46,299,530
1914.....	11,219,943	32.5	23,335,971	67.5	34,555,914
1915.....	14,072,895	33.8	27,508,255	66.2	41,581,150
1916.....	19,069,000	35.0	35,464,000	65.0	54,533,000
*1917.....	22,000,000	40.7	32,000,000	59.3	54,000,000
*1918.....	27,000,000	45.0	33,000,000	55.0	60,000,000

*Estimated.

An interesting table showing the growth of by-product coke production in the United States since the first plant was put into operation at Syracuse, N. Y., in 1893 has been prepared by the Koppers Co., Pittsburgh, and is shown in the foregoing table.

The war greatly increased the demand for chemical by-products, notably toluol, and many of the by-product coke plants begun in the past year were built at the request of the United States Government. With war demand for chemical by-products greatly curtailed there is at the moment an excess production of benzol and toluol, but hereafter, it is stated, these products will not be separated, as the toluol will not be needed in the pure state, but will be allowed to remain with the benzol as it did before the war. There will, however, be a very large commercial production of benzol, and plans are now being made for enlarging the markets for it. Among these is its use as a motor fuel, and it is believed that eventually whatever surplus of this product may be produced will be absorbed in this way. In fact, the use of benzol as a motor fuel has already been begun in a fairly large way.

The by-product plants now in operation, including those completed in 1918, and those under construction are tabulated on the opposite page.

American Industry's Part in the Great War

(*Continued from page* 46)

were created during the war. It probably will help to make permanent organizations out of such bodies as the National Research Council and the Highways Control Committees, as well as to participate with the Chamber of Commerce of the United States in trying to work out constructive programs for the further working together of the Government with the industries of the country. Grosvenor Clarkson is now the acting director of the council.

The United States Railroad Administration, of course, will continue in active operation until Congress has determined the future of the railroad problem or until President Wilson makes good his threat to turn the roads back to the owners if Congress does not act. The cessation of hostilities made no difference in the activities of the administration except to end the necessity for embargoes and priorities to carry out the war program of the War Industries Board.

The United States Shipping Board expects to continue in power as the representative of the United States in the control of the largest Government-controlled merchant marine in the world. Chairman Edward N. Hurley has given no indication that he wants to relinquish his post and it is expected that when he returns from Europe he will attempt to secure additional legislation to strengthen the position of the board.

The Emergency Fleet Corporation, which is the constructing subsidiary of the Shipping Board, also shows no signs of intending dissolution. Charles Piez has taken the place of Charles M. Schwab as director general, and Mr. Schwab has returned to the Bethlehem Steel Corporation. Mr. Piez probably will have to do some fighting against the trouble which is sure to grow out of investigations like that of the Hog Island yard, for Congress, once in an investigating mood, is liable to pry into a lot of wartime extravagances.

The United States Fuel Administration is still in full force as far as its power is concerned, but it has dismantled much of its machinery and demobilized a great share of its personnel. The administration, however, has specifically decided to remain in power until the end of the winter, to guard against possible emergencies. Although it feels that the coal, coke, oil and gas situations are so well in hand that even a severe winter can not cause hardship or a breakdown of industry, it is taking no chances.

Should Fuel Administrator Garfield be called to the Paris conference before the winter is over his place will be taken by Assistant Administrator Cyrus Garnsey, Jr., who has acted as chief of the administration repeatedly during Dr. Garfield's absence.

The board has abolished all priorities and allocations of oil, but retained them on natural gas. It has also abandoned coal and coke priorities. But it has retained the zoning and maximum price regulations on coal, to maintain a greater parity among the different sections of the country. Dr. Garfield has announced that these will not be changed before Feb. 1, 1919.

From the standpoint of industry's interest in labor, the gradual disappearance of the National War Labor Board will cause few tears. While the board itself has announced that it desired to be relieved of further work, and while it has already declined to accept new cases except upon agreements from both sides, it is generally expected that Secretary of Labor Wilson will attempt to secure legislation to continue the board in power as a peace-time labor adjustment body. To this there will be considerable opposition in Congress as well as out of it. Although former President Taft joined in the recommendation of Frank P. Walsh, the other joint chairman of the board, for its dissolution, Mr. Taft is still chairman of the board, while Mr. Walsh has given up his post.

The War Labor Policies Board has evidenced no indication that it intends to quit work. On the contrary, Chairman Felix Frankfurter has mapped out a program for further work on the question of industrial relations. It is expected that the board will attempt to induce some of the big employers of labor in the country to look upon the board as the organization in which capital can best meet labor to study questions of future relationship. So far there has been nothing to show that capital feels thus inclined toward this board, nor is there likely to be anything definite until the board has announced a more definite program.

Iron and Steel Markets

MILLS SLOWING DOWN

Operations on a Reduced Scale in the Coming Quarter

Readjustments of Contracts Urged by Buyers—New Steel Capacity

The new year opens with fresh evidences of slackening activity throughout the steel trade. In the holidays there have been many shutdowns for repairs, but resumptions this week at a number of mill centers have not been with full forces, and the prospects in some lines are that a further slowing down may come.

War work dropped off throughout December and present running schedules, as compared with those of November, show good-sized gaps. Buying of the emergency order, while it has amounted to more than many producers looked for, is plainly unequal to the replacement of what has been lost. Predictions as to rollings for the first quarter of the year range from 75 per cent to somewhat less.

In every quarter the question of the readjustment of contracts to the lower prices adopted two weeks ago by leading sellers is uppermost. Pig iron producers set out to hold to the old prices, but in the past week the calls upon them for the revision of contracts have grown in numbers and in urgency. Some furnace companies seem inclined to yield, while others strenuously insist that contracts be carried out as written. The falling off of foundry operations is a factor to which more consideration is being given, however, and the adoption of the lower basis for pig iron has found more favor than was indicated a week ago.

That some blast furnaces will not long operate with $3 taken from their market price is evident, and the readjustments in finished material will likewise impose some hard choices on high cost mills which must buy their raw materials in the market.

Pittsburgh reports skepticism among consumers as to the continued maintenance of the new prices as minimum, the situation in that respect turning on the rate at which hand-to-mouth domestic buying develops and on the willingness of foreign buyers to take hold at this level. Rails figure chiefly in the week's export inquiries, several coming up from Japan and South America, including one of 6000 tons from Brazil.

Some skirmishing between British and American steel interests for South American trade indicates that export prices from this country have been held above the competitive level. There is a serious handicap also in the high rates quoted from this country on British vessel tonnage as compared with those from British ports.

For ships now under construction, exclusive of the fabricated ships, three-fourths of the steel needed has been delivered to the yards. The present program of new ship construction for 1919 will call for nearly 2,000,000 tons of steel and the 1920 program in contemplation by the Shipping Board will take 850,000 tons. With 13,000,000 tons of dead weight of ships built and building, it now appears that there will be a total of 16,000,000 tons under the American flag.

New steel plate extras have been established by the Midvale Steel & Ordnance Co. On plates thinner than ¼ in., the extra charged is a percentage of the base price instead of a flat addition. Thus with the base price at 3c. per lb., a 3/16-in. plate will cost 3.30c. against 3.10c. under the former schedule. To adjust charges for the waste in shearing sketch plates, now that there are no Government scrap prices, the discovery was made use of that for 15 years heavy melting steel has had an average price of 40 per cent of that of plates. Already several plate mills have adopted the scale.

Some Western bar iron mills are apparently willing to sell on a Pittsburgh basis of 2.90c., which for the Chicago territory means a reduction of about $6.50 per ton. As yet no sales of Eastern bar iron have been reported on the lower basis.

The annual statistics of THE IRON AGE show that 44 new open-hearth steel furnaces were completed and put in operation in 1918, with an annual capacity of 1,945,000 tons, against 4,326,000 tons a year for those added in 1917. New steel capacity projected for 1919 or now under construction represents only 1,130,000 tons a year, and at that is more than the industry calls for under present conditions. Blast furnace construction is more in line with steel requirements than for several years. Eight furnaces were completed in 1918 with a capacity of 1,440,000 tons a year, while seven are now under construction representing 1,260,000 tons a year.

Pittsburgh

PITTSBURGH, Dec. 30—(*By wire*).

The opinion seems pretty general among consumers of pig iron, semi-finished steel and finished steel products, that the new prices, as recommended by the American Iron and Steel Institute, will not be the minimum prices that will prevail later. For this reason, the amount of new business being placed in pig iron, semi-finished steel and finished steel products is very small, consumers buying very sparingly and only what they absolutely need. It is true there are many contracts for the above-named products yet unfilled, and just how these will be worked out, and what will be eventually done with them, is a good deal of a question. There are many reports of suits to be entered later against concerns which say they cannot possibly take out material bought at the higher prices, while makers say they are prepared to insist that a contract is a contract and must be carried out. There have been a few adjustments of contracts so far, several of these being in pig iron, but many others remain as they stood. It is believed the transition period now on in the pig iron and steel markets will require considerable time. Some in the trade believe it will be three months, while others predict it will be longer before there is new buying to amount to anything. It is claimed that stocks of finished steel products in jobbers' hands are larger than generally supposed and that it will take longer to

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Per Gross Ton:	1919	1918	1918	1917
Pig Iron,	Jan. 1,	Dec. 24,	Dec. 3,	Dec. 31,
No. 2 X, Philadelphia	*$36.15*	$39.15	$39.15	$34.25
No. 2, Valley furnace	*31.00*	34.00	34.00	33.00
No. 2 Southern, Cin'ti	*34.00*	37.60	37.60	35.90
No. 2, Birmingham, Ala.	*31.00*	34.00	34.00	33.00
No. 2, furnace, Chicago*	*31.00*	34.00	34.00	33.00
Basic, del'd, eastern Pa.	*33.90*	36.90	36.90	33.75
Basic, Valley furnace	*30.00*	33.00	33.00	33.00
Bessemer, Pittsburgh	*33.60*	36.60	36.60	37.25
Malleable Bess., Ch'go*	*31.50*	34.50	34.50	33.50
Malleable Valley	*31.50*	34.50	34.50	33.50
Gray forge, Pittsburgh	*31.40*	34.40	34.40	32.75
L. S. charcoal, Chicago	38.85	38.85	38.85	37.50
Billets, etc., Per Gross Ton:				
Bess. rails, heavy, at mill	$55.00	$55.00	$55.00	....
O.-h. rails, heavy, at mill	57.00	57.00	57.00	....
Bess. billets, Pittsburgh	43.50	43.50	47.50	$47.50
O.-h. billets, Pittsburgh	43.50	43.50	47.50	47.50
O.-h. sheet bars, P'gh.	47.00	47.00	51.00	51.00
Forging billets, base, P'gh.	60.00	60.00	60.00	60.00
O.-h. billets, Phila.	47.30	47.30	51.50	47.50
Wire rods, Pittsburgh	57.00	57.00	57.00	57.00
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Common iron bars, Phila.	*3.145*	3.745	3.745	3.685
Common iron bars, P'gh.	*2.90*	3.50	3.50	3.50
Common iron bars, Ch'go.	*3.17*	3.50	3.50	3.50
Steel bars, Pittsburgh	2.70	2.70	2.90	2.90
Steel bars, New York	2.97	2.97	3.17	3.095
Tank plates, Pittsburgh	3.00	3.00	3.25	3.25
Tank plates, New York	3.27	3.27	3.52	3.445
Beams, etc., Pittsburgh	2.80	2.80	3.00	3.00
Beams, etc., New York	3.07	3.07	3.27	3.195
Skelp, grooved steel, P'gh.	2.70	2.70	2.90	2.90
Skelp, sheared steel, P'gh.	3.00	3.00	3.25	3.25
Steel hoops, Pittsburgh	3.30	3.30	3.50	3.50

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Jan. 1, 1919	Dec. 24, 1918	Dec. 3, 1918	Dec. 31, 1917
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh.	4.70	4.70	5.00	5.00
Sheets, galv., No. 28, P'gh.	6.05	6.05	6.25	6.25
Wire nails, Pittsburgh	3.50	3.50	3.50	3.50
Cut nails, Pittsburgh	5.00	5.00	5.00	4.00
Fence wire, base, P'gh.	3.25	3.25	3.25	3.25
Barbed wire, galv., P'gh.	4.35	4.35	4.35	4.35
Old Material, Per Gross Ton:				
Carwheels, Chicago	*$26.00*	$27.00	$29.00	$30.00
Carwheels, Philadelphia	25.00	25.00	29.00	30.00
Heavy steel scrap, P'gh.	*22.00*	25.00	27.50	30.00
Heavy steel scrap, Phila.	*18.00*	20.00	27.00	29.00
Heavy steel scrap, Ch'go.	*19.00*	23.00	26.50	30.00
No. 1 cast, Pittsburgh	27.00	27.00	28.00	30.00
No. 1 cast, Philadelphia	*24.00*	28.00	29.00	30.00
No. 1 cast, Ch'go (net ton)	*25.00*	26.00	27.00	25.50
No. 1 RR. wrot, Phila.	*25.00*	32.00	34.00	35.00
No. 1 RR. wrot, Ch'go (net)	*21.50*	25.00	28.00	31.25
Coke, Connellsville,				
Per Net Ton at Oven:				
Furnace coke, prompt	$6.00	$6.00	$6.00	$6.00
Furnace coke, future	6.00	6.00	6.00	6.00
Foundry coke, prompt	7.00	7.00	7.00	7.00
Foundry coke, future	7.00	7.00	7.00	7.00
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	*23.00*	26.00	26.00	23.50
Electrolytic copper, N. Y.	*23.00*	26.00	26.00	23.50
Spelter, St. Louis	*7.65*	8.05	8.25	7.62½
Spelter, New York	*8.00*	8.40	8.60	7.87½
Lead, St. Louis	*5.70*	6.15	6.75	6.35
Lead, New York	*6.00*	6.50	7.05	6.50
Tin, New York	*71.50*	72.00	70.00	85.50
Antimony (Asiatic), N. Y.	7.62½	8.00	8.50	14.75
Tin plate, 100-lb. box, P'gh.	$7.35	$7.35	$7.75	$7.75

work these off than was expected. In the meantime, jobbers are not likely to buy very much until their stocks have been very greatly reduced. The present high labor costs are going to be an important factor in the readjustment of prices on pig iron, semi-finished and finished steel, and the declines that are expected to come may be much less than consumers and jobbers expect. As an example, it is known positively that present costs of making basic iron by several merchant furnaces are around $32, and with the price of basic iron now ruling at $30, such furnaces have a serious problem to work out. This also applies to other lines, and consumers who have bought pig iron on the basis of $33 for basic and $35.20 for Bessemer, cannot possibly put this iron into billets, wire rods, sheet bars, and finished steel at to-day's prices and get out even. Until all these problems have been worked out, the amount of new business going to the blast furnaces and steel mills is very likely to be relatively small. Large quantities of steel in various forms are being offered by the Government in the market, through the mills that took orders for the steel originally, and at very low prices, and this is helping to demoralize the market to a considerable extent. It is known that shell steel, in the form of billets and slabs, has been offered below regular billet prices, while shell steel discards were offered here several weeks ago as low as $34 a ton, and could be bought to-day at less. The Canadian Government is also offering a good deal of material of various kinds in this market, but so far very little has been done, as buyers seem afraid to take hold, even at the low prices at which the material is being offered. The supply of labor is steadily getting better, and some in the trade believe that just as soon as the supply of labor is larger than the demand, there will be a readjustment of prices for many kinds of labor on a much lower basis than now exists. There is still a great scarcity in the supply of furnace coke, and Sharpsville blast furnace at Sharpsville, Pa., has been down for about a week for lack of fuel. Several other blast furnaces in the two valleys have been banked for a day or two and three days at a time, waiting for coke to arrive. The impression is general that some isolated furnaces will not be able to compete in the market at the lower prices now ruling for pig iron, and may have to go out of blast in the near future. Several steel plants in this city that formerly were running about 100 per cent on war materials, contracts for which have been canceled, are now practically down in all departments, and are holding up shipments of pig iron and other materials.

Pig Iron.—While it is true that a good many merchant blast furnaces have considerable iron sold for delivery in first quarter and first half, there is a question whether some consumers will be in position to take this iron out, and many requests have already gone into blast furnaces asking them to hold up shipments, which is being done as far as possible. One local open-hearth steel interest has 13,000 tons or more of basic iron due it at the $33 price, and this iron is being offered for resale in the local market at $30, and probably could be bought for less. One interest sold 1000 tons of it at $30 per ton, and it is reported that 3000 to 4000 tons have been canceled, the buyer paying $3 per ton to the furnace that agreed to cancel. Consumers that have pig iron due them, but which was not delivered owing to the iron being allocated by the Government to other consumers working on war materials, and which contracts expire by limitation on Dec. 31, take the position that they should not be expected to take this iron, and are insisting that the furnaces cancel it. Such cases as these are creating a good deal of confusion in the pig iron market, and it will be some time before they are straightened out. All furnaces that have any iron to sell would be glad to accept the new prices, which are $3 per ton under former Government prices, if there were any buyers, but consumers are buying only such quantities of iron as they absolutely need and for spot shipment. There has been one sale of 250 tons of Bessemer at $32.20, one of 500 tons of basic at $30 and another of 1000 tons at $30, all for spot shipment. We

quote the new prices as effective from Jan. 1, as follow:

Basic pig iron, $30; Bessemer, $32.20; gray forge, $30; No. 2 foundry, $31; No. 3 foundry, $30.50, and malleable $31.50, all per gross ton at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh district being $1.40 per ton.

Ferroalloys.—At a conference of four or five leading makers of ferromanganese held last Friday, a price of $225 per ton, delivered for 70 per cent ferromanganese for delivery in first half of this year was agreed upon, with a price of $3 per ton for each higher unit than 70 per cent. However, consumers of ferromanganese and other ferroalloys are fully covered for some time ahead, and there is practically no buying. Some ferromanganese and also 50 per cent ferrosilicon are being offered for re-sale, without finding buyers. Prices on ferromanganese are now $15 per ton lower, on 16 to 18 per cent spiegeleisen about $5 lower, and on 50 per cent ferrosilicon at least $10.

We quote 70 per cent ferromanganese at $225, delivered, and 16 to 18 per cent spiegeleisen, $65, f.o.b. furnace, an addition or deduction of $3.50 per unit being made, when the manganese content is above or below the standard. For delivery over the remainder of the year, and for next year, 50 per cent ferrosilicon is quoted at $125.

We quote 9 per cent Bessemer ferrosilicon at $52; 10 per cent, $54; 11 per cent, $57.30; 12 per cent, $60.60. We quote 6 per cent silvery iron, $39; 7 per cent, $40; 8 per cent, $42.50; 9 per cent, $44.50; 10 per cent, $47. Three dollars per gross ton advance for each 1 per cent silicon for 11 per cent and over. All the above prices are f.o.b. maker's furnace, Jackson or New Straitsville, Ohio, these furnaces having a uniform freight rate of $2.90 per gross ton, for delivery in the Pittsburgh district.

Plates.—Mills report that while the readjustment in the steel market is going on, they do not expect any material demand for plates, and specifications on contracts are being held up to some extent. It is said that one or two large makers of plates have agreed to revise existing contracts to the new basis of 3c. at mill, Pittsburgh, on all shipments after Jan. 1, but this has not been done by all the mills, some taking the position that contracts for plates for specific jobs are not subject to adjustment. The two local steel car companies have had heavy cancellations of war materials, and will not require as large quantities of plates as formerly.

We quote sheared plates at 3c., Pittsburgh mill, for delivery ofter Jan. 1.

Billets and Sheet Bars.—No new contracts are being made for billets or sheet bars at the new prices of $43.50 for 4 x 4 in. Bessemer and open-hearth billets and $47 for sheet bars. On the other hand, shell steel billets and sheet bars are being offered by consumers for re-sale at the above-named prices, or even lower. Shell steel discards are being offered here below $34 per ton. The supply of sheet bars and billets is more plentiful, but the tin plate mills are not running to any thing like full capacity, and are not taking in as many bars as formerly.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at $43.50, sheet bars $47, slabs $46, and forging billets $56 base, all f.o.b. at mill, Pittsburgh or Youngstown.

Structural Material.—Local fabricators report that no new commercial jobs are being placed, while specifications on a good many Government jobs are being held up. However, it is said the structural shops are fairly well filled for the next two or three months. We quote beams, and channels up to 15 in. at 2.80c. at mill, f.o.b. Pittsburgh.

Iron and Steel Bars.—Implement makers are still contending they should be allowed another concession in price of steel bars, as their price at present is only $1 per ton lower than that to ordinary small consumers. They claim that buyers of agricultural implements are insisting on lower prices for farming machinery, which the implement makers say they cannot grant and pay 2.65c. for steel bars. The demand for both iron and steel bars is very quiet, and it is said common iron bars have sold at very close to 3c. at mill.

We quote soft steel bars rolled from billets at 2.70c.; from old steel rails, 2.80c.; common iron bars, 2.90c.; bar iron rolled from selected scrap, 3.65c.; and refined iron bars at 4.40c. at mill, Pittsburgh.

Sheets.—Reports are that the sheet mills are operating at 75 per cent or more of capacity, and have orders that will carry them over the next month or two. Large Government contracts for sheets, while not yet canceled, are being held up, and it is very probable the material will not be taken out. Most of the sheets now being rolled and shipped are for commercial uses. Stocks held by jobbers are reported to be fairly heavy, and not much new demand is expected from this class of trade, until stocks have been pretty well worked off. Some consumers are taking the position that the reduction of $6 per ton on sheets does not represent the ultimate minimum of the market, and are holding off placing new orders, except for such quantities of sheets as are actually used.

We quote: For delivery after Jan. 1; 3.90c. for No. 10 blue annealed, 4.70c. for No. 28 black and 6.05c. for No. 28 galvanized, all f.o.b. Pittsburgh or Youngstown mill.

Tin Plate.—Operations among the tin plate mills are down to a 50 per cent or less basis, some mills being entirely shut down for much needed repairs and inventory. So far, little has been done in the making of new contracts for 1919 delivery, but all the mills carry over a good deal of business into the new year that should have been shipped out in the last quarter of 1918. There is some export inquiry on which the mills usually quote $7.75 per base box at mill.

Coke.—There is still a scarcity in the immediate supply of Connelsville furnace coke, and some furnaces are running very close to shore, and unless shipments get better, they may have to bank. The holiday last week and the one this week will cut into production very seriously. No word has been received from the Fuel Administration as to whether it will relinquish control of prices. The Connellsville *Courier* gives the output of coke for the week ending Dec. 21 as 288,505 tons, a net increase over the previous week of about 45,000 tons.

We quote 48 hr. beehive blast furnace coke at $6; 72 hr. beehive foundry coke at $7 and crushed coke over ¾ in. at $7.30, all in tons of 2000 lb. at oven. We quote by-product coke at $5.70 for run of ovens and $6.70 for selected foundry in all States but Alabama and Washington. To these base prices should be added the freight rate from the competing beehive coke district which takes the lowest freight rates to the point where such by-product coke is produced, except that there shall be added for coke manufactured in New England 7c. for each 5c. above 60c. in the freight charges per ton (2240 lb.) of coal for water transportation on the coal used in the manufacture of such coke.

Old Material.—Stocks of scrap held by local consumers are abnormally heavy and dealers do not believe there will be any considerable demand for scrap until these stocks are pretty well worked off, which will require several months or longer. In addition, very large quantities of scrap are being offered in this market, the Canadian Government alone trying to sell 150,000 tons here, but so far without success. Our own Government is also offering some finished steel at practically scrap prices, and this is helping to demoralize the local market. Prices on foundry grades of scrap are holding up much better than on the steel grades. Prices quoted below are largely normal on account of no material moving from dealers to consumers:

Heavy steel melting, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh, delivered	$22.00 to $25.00
No. 1 cast, for steel plants (nominal)	27.00 to 28.00
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Franklin, Pa., and Pittsburgh (nominal)	27.00 to 28.00
Compressed steel	20.00 to 21.00
Bundled sheet, sides and ends, f.o.b. consumers' mills, Pittsburgh district (nominal)	19.00 to 20.00
Bundled sheet stamping (nominal)	18.00 to 19.00
Railroad grate bars (nominal)	19.00 to 20.00
Low phosphorus melting stock	24.00 to 25.00
Iron car axles (nominal)	42.00 to 43.00
Locomotive axles, steel (nominal)	45.00 to 46.00
Steel car axles (nominal)	42.00 to 43.00
Railroad malleable (nominal)	22.00 to 23.00
Machine shop turnings	12.00 to 13.00
Cast iron wheels	28.00 to 29.00
Rolled steel wheels (nominal)	24.00 to 25.00
Sheet bar crop ends (at origin) (nominal)	32.00 to 33.00
Heavy steel axle turnings (nominal)	16.50 to 17.00
Heavy breakable cast	27.00 to 28.00
Cast iron borings	18.00 to 19.00
No. 1 railroad wrought	30.00 to 31.00

Chicago

CHICAGO, Dec. 30.

In every direction new business is lacking. The season is one in which quiet may be expected, and coupled with the usual quieting influences this year is hesitancy on the part of consumers, inspired by their uncertainty as to prices. If words count for anything, the producers of iron and steel are sympathetic with the consumers and intend giving them a square deal.

The producers themselves are grappling with the solution of a question which means millions of dollars to them, the revision of contracts to make contract prices conform with the new levels recently suggested by Judge Gary at Washington. There is no question whatever that the new prices have been accepted for new 1919 business, and it unquestionably is the general intention to apply these prices to old orders, except in special cases where the old prices were used as the basis for secondary contracts, but no official announcement of this policy has yet been made. This practically will mean starting the new year with a clean slate and, it is hoped, a stabilized market. As stated two weeks ago, the leading interest intends to care for the interests of its customers.

In the matter of prices, whether on new business or on contracts, the pig iron trade is at sea. The larger producers have quoted on the base of $31 on new business, but some Southern and some small Northern furnaces are not in accord, at least their policy is now one of simply waiting. They are well sold ahead. As important, if not more so, than the quotation on new business, is a proposal to revise all contracts on the new basis, entailing a reduction of $3 per ton on hundreds of thousands of tons. Naturally there is no unanimity on this. Consumers are asking for it, pointing out undeniably good reasons for their relief. Representatives of the larger producers admit the justice of the claim and say a decision will be reached by Jan. 2. Their willingness to discuss the question, their admission of justice in the claims of the melters and their expressed unwillingness to penalize good customers forecast a decision in favor of the latter. The strongest argument of the melter is that, had the Price-Fixing Committee of the War Industries Board accepted the suggested prices, the lower figures would have affected contracts. Buying under war conditions, they agreed to pay an arbitrary price because they could not do otherwise. Conditions permitted them to exercise no judgment in the matter of buying and in self-protection they agreed to take what was offered to them. It may be pointed out to consumers that in the case of one company alone the lower price, assuming its 1919 bookings are fulfilled, will mean a difference of $2,800,000 to the producer.

The jobbers in iron and steel enter the new year with prices revised downward. A new price, 2.90c. Pittsburgh, has been made for bar iron.

While the steel mills have enough business in plates, shapes and bars to last them for a few weeks, they see in prospect gaps in rolling schedules unless activity begins in January.

The Illinois Steel Co. has laid off a number of men in its South Works electric steel department and is operating only one 25-ton electric furnace. The furnaces were until recently engaged on material for ordnance and with contracts canceled the curtailment followed, the reason given being lack of orders.

With all the quiet, it is pointed out that reasons advanced months ago as justification for belief that good business will follow the war are as good to-day as they were then.

The new export corporation is favorably regarded and its personnel praised, but it is doubtful whether some companies in the Chicago district will enter the corporation until suitable adjustments are made in regard to freight rates to the seaboard.

The new form of contract is favorably regarded as something sought for years, and will be put into effect as soon as it is officially promulgated by the American Iron and Steel Institute.

Pig Iron.—Although the large producers of pig iron freely admit their acceptance of $31 as the base price for new business after Jan. 1, the producers are not a unit, for several Southern furnaces have given no indication of accepting the new base, nor is the course of the charcoal iron and silvery makers clearly marked. The producers hope to retain the present differentials for silicon, these ranging from $1.25 per ton upward, each additional 50 points taking a large extra. It is declared that the old differential of 50c. per ton for each 50 points never paid the cost of the higher silicons. A big question, one which involves diminished profits aggregating millions, is that of revising contracts to make them conform with the $31 base, a step which would be at variance with all precedent. Consumers are asking what is to be done for them in this particular, and it is recognized that something must give way. The melters argue that had the Government Price-Fixing Committee remained in existance and the suggested prices been accepted, contract prices would have been revised; that they agreed to pay $34 only because they were compelled to, and that they could exercise no judgment as to when to buy. They were told they could have so much iron, and in self protection they agreed to take it. The proposal that contracts be revised downward is received favorably by executives of pig iron companies, although no official announcement as to what will be done has been made. A decision is expected by Jan. 2. Some of the pig iron men say they do not wish to see their good customers penalized by being held to the Government maximum of the last quarter, and they predict revisions. Meanwhile, most of the furnaces are waiting, and there is no buying worth being considered.

The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable and steel-making irons, including low phosphorus, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$38.70 to $39.00
Lake Superior charcoal, C to AA	40.70 to 42.50
Lake Superior charcoal, No. 6	41.20 to 41.50
Northern coke foundry, No. 1, silicon, 2.25 to 2.75	32.25
Northern coke foundry, No. 2 silicon, 1.75 to 2.25	31.00
Northern high-phosphorus foundry	31.00
Southern coke, No. 1 foundry and No. 1 soft silicon, 2.75 to 3.25	39.00
Southern coke, No. 2 foundry, silicon, 2.25 to 2.75	47.25
Southern foundry, silicon, 1.75 to 2.25	36.00
Malleable, not over 2.25 silicon	31.50
Basic	30.00
Low phosphorus (copper free)	52.50
Silvery, 7 per cent	50.00

Ferroalloys.—From the viewpoint of sellers, the ferromanganese market is worse than inactive, as offers made to consumers have resulted in counter offers from the consumers themselves of resale material at a lower price. This, of course, does not make a market, but it is illuminating as to the view of consumers. There is nothing whereby the market may be accurately judged, and prices are strictly nominal. Some spiegeleisen has been sold on the basis of $71, Chicago, which is about equivalent to $65, furnace.

We quote 70 per cent ferromanganese nominal at $225, delivered; 50 per cent ferrosilicon at $155 to $162.50, delivered, and 16 to 18 per cent spiegeleisen at $70 furnace.

Plates.—Business in plates would have been very fair indeed in the closing days of the year, were it not for the effort of the Emergency Fleet Corporation to enforce concentration on the upbuilding of the American merchant marine before helping others. It will allow sales of wooden ships and of composite ships to foreign interests, but steel ships must be made for or sold to American companies financed by American capital. In consequence, a tonnage of plates large in the aggregate, intended for French, Norwegian and Greek ships, could not be accepted. Japanese consumers have been panicky, and cable they are not interested in offerings. Incidentally, the Japanese have been unloading some high-priced steel, or at least trying to. At the same time, the mills are less worried over plates than they are over other forms of steel. Jobbers announce a new price in keeping with the reduction of mill prices.

The mill quotation is 3c., Pittsburgh, the freight to

Chicago being 27c. per 100 lb. Jobbers quote 4.27c. for plates out of stock.

Bars.—In mild steel bars there is but little or no new business, but the mills have enough on their books to carry them well into January. They see big gaps in rolling schedules before many weeks elapse unless new business is forthcoming. The new price for bar iron is 2.90c. Rail carbon steel bars are quoted at 3c., Chicago.

Mill prices are: Mild steel bars, 2.70c., Pittsburgh, taking a freight rate of 27c. per 100 lb.; common bar iron, 2.90c., Pittsburgh; refined iron bars, 3.65 to 4.40c.; rail carbon, 3c., Pittsburgh.

Jobbers quote soft steel bars 3.97c., bar iron, 4.17c., for ¼ in. thick and heavier. Reinforcing bars, 4.29½c. base. Under the new price there is no charge for twisting, but extras for sizes are quoted as per card. Shafting, list plus 9 per cent with quantity extras.

Sheets.—Consumers continue to show a disposition to hold off, and the mills are not so well fixed with sheet orders as with those for other products. They can obtain business if they will guarantee the buyers against declines, but this they will not do. The new prices on mill shipments are 4.70c. for No. 28 black sheets, 3.95c. for No. 10 blue annealed and 6.05c. for No. 28 galvanized, all Pittsburgh. Jobbers have made new prices for warehouse deliveries.

Chicago delivery out of stock regardless of quantity, No. 10 blue annealed, 5.17c.; No. 28 black, 6.22c., and No. 28 galvanized, 7.57c.

Old Material.—The bulk of the business being done, and that is not a great deal, is between dealers. While this trading makes a price, it is one which dealers are often unwilling to make to the mills. What the dealer will pay depends on the urgency with which contracts must be filled, but these nearly all will be cleaned up by Jan. 1. Consumers have picked up a few bargains, but as a rule they say they are not interested, and will not be until later in January. About the only item in which there is an element of strength is No. 1 cast. The general decline continues.

We quote for delivery in buyers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Iron rails	$31.00 to $32.00
Relaying rails	50.00 to 55.00
Carwheels	26.00 to 27.00
Steel rails, rerolling	24.00 to 25.00
Steel rails, less than 5 ft.	24.00 to 25.00
Heavy melting steel	19.00 to 20.00
Frogs switches and guards, cut apart	19.00 to 20.00
Shoveling steel	19.00 to 20.00
Heavy steel axle turnings	16.00 to 17.00
Per Net Ton	
Iron angles and splice bars	$29.00 to $30.00
Steel angle bars	22.00 to 23.00
Iron arch bars and transoms	34.50 to 35.00
Iron car axles	36.00 to 37.00
Steel car axles	32.00 to 33.00
No. 1 railroad wrought	21.50 to 22.50
No. 2 railroad wrought	20.00 to 21.00
Cut forge	20.00 to 21.00
Pipes and flues	17.00 to 18.00
No. 1 busheling	19.00 to 20.00
No. 2 busheling	12.00 to 13.00
Steel knuckles and couplers	26.50 to 27.00
Coil springs	27.00 to 28.00
No. 1 cast	25.00 to 26.00
Boiler punchings	26.00 to 27.00
Locomotive tires, smooth	30.00 to 31.00
Machine-shop turnings	10.00 to 10.50
Cast borings	11.50 to 12.50
Stove plate and light cast	17.00 to 17.50
Grate bars	16.50 to 17.00
Brake shoes	16.50 to 17.00
Railroad malleable	20.00 to 21.00
Agricultural malleable	19.00 to 20.00
Country mixed	13.00 to 14.00

Rails and Track Supplies.—New business is lacking, but the mills have enough rail tonnage booked to last them several months.

Standard railroad spikes, 3.65c., Pittsburgh Track bolts, with square nuts, 4.90c., Pittsburgh. Tie plates, steel, 3c., Pittsburgh and Chicago; tie plates, iron, 3.75c., f.o.b. maker's mills. The base for light rails is 3c., f.o.b. maker's mill, with usual extras.

Wire Products.—Prices and selling policies are unchanged. The market is quiet, partly in sympathy with the general situation, also because of the taking of inventories. For prices see finished iron and steel f.o.b. Pittsburgh, page 87.

Bolts and Nuts.—The expected reduction in bolt and nut prices did not come, and to-day the makers are holding firmly to their quotations, jobbers doing likewise. It is pointed out that the bolt and nut makers reduced their prices a few months ago to a point which placed their products, like wire, on a reasonable basis. At present the market is quiet, with no contracts being entered. For mill prices see finished iron and steel f.o.b. Pittsburgh. Jobbers quote as follows:

Structural rivets, 5.67c.; boiler rivets, 5.77c.; machine bolts up to ⅝ x 4 in., 40 per cent off; larger sizes 25 and 5 off; carriage bolts up to ⅝ x 6 in., 35 off; larger sizes, 20 and 5 off; box pressed nuts, square tapped, 78c. off; hexagon tapped, 58c. off; coach or lag screws, gimlet points, square heads, 40 per cent off. Quantity extras for nuts are canceled.

Cast Iron Pipe.—Pending propositions embrace 1000 tons wanted by Toledo, Ohio, bids having been taken, and 300 tons on which a Wyandotte, Mich., contractor took bids Dec. 30. The 5000 tons wanted by Akron, Ohio, still hangs fire. The industry is anxiously watching the pig iron market, and to date has announced no change in prices.

We quote per net ton, f.o.b. Chicago, ex-war tax, as follows: Water pipe, 4-in., $69.80; 6-in. and larger, $66.80; class A and gas pipe, $1 extra.

Structural Material.—Extreme quiet prevails in shapes. The best prospect is about 40,000 tons which will be required for the Michigan Boulevard improvement and other Chicago bridges. It is hoped this tonnage will be placed this month, although not all is required for delivery that promptly.

The mill quotation is 2.80c., Pittsburgh, which takes a freight rate of 27c. per 100 lb. for Chicago delivery. Jobbers quote 4.07c. for material out of warehouse.

Buffalo

BUFFALO, Dec. 31.

Pig Iron.—Some furnacemen appear to be inclined to put on the soft pedal in talking about the reduction of prices for 1919, but it is generally conceded that the lower scale as recommended by the steel committee will apply on new business contracted for after Jan. 1 for 1919 delivery. There is a united determination on the part of producers, however, to keep the ship close hauled to the wind when it comes to the matter of price to be charged for shipments on existing contracts and allotments. This year shows no exception to the usual rule of a let-up in orders during the holiday and inventory season. Furnaces as a whole are making good shipments on contracts, although a few melters are easing up on manufactured output during the process of inventory and taking a little less volume of iron. Some furnaces are suffering slightly for coke, which continues to be scarce owing to lessened production at ovens on account of less intensive labor during the Christmas holidays, and it is expected that the falling off in production on this account may continue for a week or so. There is not a very large tonnage of iron to dispose of for the latter part of first half; many furnaces have sold nearly 90 per cent of estimated output and not much special effort is likely to be made for third quarter sales until further along toward spring. We quote the following schedule of prices for new business contracted for after the first of the year, f.o.b. furnace Buffalo:

No. 1 foundry, 2.75 to 3.25 silicon	$34.00
No. 2 X, 2.25 to 2.75 silicon	32.00
No. 3 foundry, 1.75 to 2.25 silicon	31.00
Gray forge	30.00
Malleable, silicon not over 2.25	31.50
Basic	30.00
Bessemer	32.50
Lake Superior charcoal, regular grades, f.o.b. Buffalo	38.50

Old Material.—The market continues dull and inactive. It is expected, however, more interest will develop after inventories are completed. There has not been sufficient trading this week to define the market. The few small tonnage transactions made being at sacrifice prices and consisting of small lots thrown on the market because of its demoralization. Dealers expect a considerable influx of discard shell scrap shortly and of billets that were made up for the manufacture of shells and will now have to be sold for scrap—and if buying of heavy metal steel sets in after the

first of the year, it will establish its own price which is usually $3 or $4 under pig iron. The proposed adoption by steel mills of a form of contract for finished products has set some dealers to thinking that it might be well to adopt more formal and binding contracts covering scrap transactions governing both seller and buyer, and enforcing more exact and rigid compliance with terms, asking co-operation of mills in the weeding out of the more flagrant violators of contracts by declining to accept bids from them. The price schedule has sagged owing to lack of transactions, and is nominally as follows, per gross ton f.o.b. Buffalo:

Heavy melting steel regular grades	$23.00 to $24.00
Low phosphorus, 0.04 and under	29.00 to 30.00
No. 1 railroad wrought	27.00 to 28.00
No. 1 machinery cast scrap	27.00 to 28.00
Iron axles	35.00
Steel axles	35.00
Carwheels	27.00 to 28.00
Railroad malleable	29.00 to 30.00
Machine shop turnings	15.00 to 16.00
Heavy axle turnings	19.00 to 20.00
Clean cast borings	16.00 to 17.00
Iron rails	30.00 to 31.00
Locomotive grate bars	23.00 to 24.00
Stove plate	25.00 to 26.00
Wrought pipe	21.00 to 22.00
No. 1 busheling scrap	20.00 to 21.00
Bundled sheet stamping scrap	20.00 to 21.00

Philadelphia

PHILADELPHIA, Dec. 31.

On the eve of the new year, business in this market has dropped almost to the vanishing point. There are no sales of importance, though a few small transactions have taken place during the past week in pig iron and scrap.

Opinions among producers of steel as to the future of business are somewhat at variance. A few are genuinely concerned over the immediate outlook, while others are in a fairly comfortable position for one or two months or more and believe that by the time they are seriously in need of business it will be forthcoming. It is significant, however, of the trend of events that at least one plate mill in this district will be shut down some time in January because of lack of business, and it is predicted that some of the smaller mills will be obliged to shut down for an entirely different reason, this being that their high costs will make it impossible for them to compete for business at the new schedule of prices.

Some of the Class 3 steel mills are not marking their prices down to the levels now quoted by their larger competitors, but are continuing to quote the Government prices which prevailed during the past quarter. Whether they will succeed in booking any business at these higher prices is open to question. At least two of the large steel producers in the Pittsburgh district, with sales offices here, are revising prices on some of their contracts to the new basis. This applies particularly on material for resale, such as jobbers' requirements, but it is understood will not apply on firm orders such as were placed for ships, cars and locomotives.

Pig Iron.—Some small sales of eastern Pennsylvania basic and foundry iron have been made by a leading seller on the new price basis, which is $3 a ton lower than the recently prevailing Government prices. However, the Pittsburgh-Philadelphia freight rate is still being figured in. Thus the price for basic iron at furnace is $30, but the delivered price in Philadelphia is $30, plus the freight rate from Pittsburgh of $3.90. Virginia producers have not definitely settled upon any policy, nor is it known here as yet what Southern producers may do, but it is taken for granted that if they want business they will meet this price. Two or three Virginia producers of foundry iron will soon be seeking orders, but there is so little demand from consumers it is doubted whether a cut in prices would bring out any volume of business. The present disposition of some Virginia producers is to quote No. 2 foundry at $31 furnace, and add the Birmingham-Philadelphia freight rate of $6.50, making the delivered price $37.50, while others are considering quoting $34 at furnace and adding only the freight rate from furnace to Philadelphia of $4.10. Selling agents doubt whether consumers would be likely to do business on either basis, which leads to the assumption that both Virginia and Southern furnaces will soon be obliged to compete evenly with the eastern Pennsylvania furnaces. Buffalo furnaces are quoting the new prices, $30 for basic and $31 for No. 2 foundry at furnace, and one Buffalo interest has informed its customers that it will revise prices downward $3 a ton on all contracts wherein the price on 1919 shipments was to be the "Government price." Consumers have been urging other furnaces to make similar revisions, but in all other instances reported the sellers have declined to do this. Not all furnaces are quoting the new prices, their attitude being due to the well-sold-up condition of their order books and also to the fact that they do not believe that a reduction would bring out any business. They prefer to stand pat on prices for the present, and a further reason for this attitude may be the desire to avoid controversy with customers over the question of price revision. A Cumberland, Md., consumer is in the market for 2400 tons of basic for January-February shipment, but will buy in Pittsburgh on account of a more advantageous freight rate. Up to Monday, however, the lowest Pittsburgh quotation was $33, Valley furnace, and the business was not closed, the buyer holding out for a $30 quotation. We quote standard grades of iron for delivery in Philadelphia as follows:

Eastern Pennsylvania No. 2 X (2.25 to 2.75 si.)	$36.15
Eastern Pennsylvania No. 2 foundry (1.75 to 2.25 si.)	34.90
Virginia No. 2 X (2.25 to 2.75 si.)	38.75
Virginia No. 2 foundry (1.75 to 2.25 si.)	37.50
Basic	33.90
Gray forge	33.90
Standard low phosphorus	51.90
Copper-bearing low phosphorus	48.90

Ferroalloys.—A meeting of producers of ferromanganese and spiegeleisen was held last week in New York and the general situation was discussed. There is an oversupply of all alloys and no buying interest. Producers will now quote $225 per ton, delivered, for 70 per cent ferromanganese and $67.50, f.o.b. furnace, for 16 to 18 per cent spiegeleisen, with an extra of $3 per unit for higher grades. Owing to the oversold condition of the market, buyers are not interested at any price.

Finished Steel.—Eastern Pennsylvania mills are not a unit on revision of prices to the lower basis, but Pittsburgh and Youngstown mills are quoting the lower prices here. No business of importance is being done. Class 3 mills will continue to quote 3.25c. on plates and 3c. on structural material, for the present at least, but whether any business can be closed at these maximum prices remains to be seen. The attitude of steelmakers who are not reducing prices is that they would rather shut down their mills than to take business at a loss. Shipbuilding and car and locomotive building will give some of the plate and shape mills a fair amount of business for some time to come, but all producers are not in a favorable position as to orders. In fact, one plate mill may be shut down within the next few weeks on account of lack of business. Demand for all forms of finished steel is light, with the exception of rails, for which there is an active export demand from the Far East and South America.

Old Material.—A large eastern Pennsylvania consumer of heavy melting steel has been buying during the past week, having paid $20, delivered at its works, but later offered only $18, and if more business is closed it will probably be at this figure. All scrap prices are decidedly weaker, but the prices quoted below are largely based on transactions among dealers or represent the views of dealers as to prices that may obtain when buying is resumed. The Government has two or three million tons of scrap which it desires to dispose of, but it is doubted whether it will be forced on an unwilling market. We quote the following prices, many

of them merely nominal, for delivery in the Philadelphia district:

No. 1 heavy melting steel	$18.00 to $20.00
Steel rails, rolling	26.00 to 28.00
No. 1 low phosphorus, heavy, 0.04 and under	26.00 to 27.00
Iron rails	30.00 to 35.00
Carwheels	25.00 to 26.00
No. 1 railroad wrought	25.00 to 26.00
No. 1 yard wrought	22.00 to 23.00
Country yard wrought	14.00 to 15.00
No. 1 forge fire	19.00 to 21.00
Bundled skeleton	19.00 to 21.00
No. 1 busheling	20.00 to 21.00
No. 2 busheling	16.00 to 17.00
Turnings (for blast furnace uses)	14.00 to 15.00
Machine-shop turnings (for rolling mill use)	15.00 to 16.00
Cast borings (for blast furnace use)	14.00 to 15.00
Cast borings (clean)	17.00 to 18.00
No. 1 cast	24.00 to 25.00
Grate bars	18.00 to 20.00
Stove plate	19.00 to 21.00
Railroad malleable	18.00 to 20.00
Wrought iron and soft steel pipes and tubes (new specifications)	18.00 to 20.00
Ungraded pipe	17.00 to 18.00

Birmingham

BIRMINGHAM, ALA., Dec. 30.

Pig Iron.—The last week of the year found the Birmingham district iron producers outside of the leading interest apparently more determined to hold to the Government price than they were the preceding week, probably due to the fact that the lower schedule made by the steel interests failed to induce proffers of any considerable business. In the absence of actual transactions and the disposition of consumers to hold off under any basis, adherence to the old price seems as plausible as accepting the lower. Questioning failed to develop the admission of a single order booked at the lower price, while a few carload sales of high silicon for immediate delivery were made at the Government level. Some considerable buying movement will determine the Birmingham district price for 1919. It is nominally $34, but, with no business reported, what might be done under proffer of a sizable tonnage one does not know. There is more reticence in the trade than last week, but it appears to be due as much to the uncertainty of things as to unwillingness to disclose. The turn of the year will have to be made before a real price basis develops. The holidays will be longer than usual this year, and furnace practice will suffer as the result. Based on the few transactions entered on order books, we quote nominal prices per gross ton f.o.b. Birmingham district furnaces as follows:

No. 2 foundry and soft	$34.00
Basic	33.00

St. Louis

ST. LOUIS, Dec. 30.

Pig Iron.—The end of the year finds the pig iron market entirely without life, the consumers being unwilling to consider purchases at the inventory period, inasmuch as they have reasonable supplies on hand or due, while the furnaces generally have not yet indicated any disposition to make any attractive offerings for the new year. There are reports of one or two furnaces offering first half contracts at a reduction of $3 from the Government fixed price, as suggested by the conference of the iron and steel men some time ago, but these have not sufficient capacity available to make any appreciable impression on the market, while the far greater number of the representatives in the market are under instructions to make no concessions and also not to offer any large tonnages for the first half, on the ground that capacity is too well booked up to justify this. Some odd lots appear from week to week, but these are having no bearing on the market as a whole.

Old Material.—The scrap market continues very demoralized, and with no one willing to buy, while dealers who are long are still endeavoring to unload. There is no demand among the consumers and none is now really expected much before the first of February. No railroad lists have appeared during the week, though the first of the year is expected to bring out additional railroad scrap to add to that which has been helping the market in its downward course during recent weeks.

Per Gross Ton	
Old iron rails	$29.00 to $30.00
Old steel rails, rerolling	23.00 to 24.00
Old steel rails, less than 3 ft	20.00 to 20.50
Relaying rails, standard sections, subject to inspection	45.00 to 50.00
Old carwheels	22.00 to 22.50
No. 1 railroad heavy melting steel	19.00 to 19.50
Heavy shoveling steel	18.00 to 18.50
Ordinary shoveling steel	17.00 to 17.50
Frogs, switches and guards, cut apart	19.00 to 19.50
Ordinary bundled sheet scrap	11.00 to 11.50
Heavy axle and tire turnings	12.00 to 12.50
Per Net Ton	
Iron angle bars	$22.00 to $23.00
Steel angle bars	18.00 to 18.50
Iron car axles	33.00 to 33.50
Steel car axles	28.00 to 28.50
Wrought arch bars and transoms	29.00 to 30.00
No. 1 railroad wrought	22.00 to 22.50
No. 2 railroad wrought	21.00 to 21.50
Railroad springs	18.00 to 18.50
Steel couplers and knuckles	18.50 to 19.00
Locomotive tires, 42 in. and over, smooth inside	16.00 to 16.50
No. 1 dealers' forge	13.00 to 13.50
Cast iron borings	11.50 to 12.00
No. 1 busheling	19.00 to 19.50
No. 1 boilers cut to sheets and rings	12.00 to 12.50
No. 1 cast	18.00 to 18.50
Stove plate and light cast	14.00 to 14.50
Railroad malleable	16.00 to 16.50
Agricultural malleable	14.00 to 14.50
Pipes and flues	14.00 to 14.50
Heavy railroad sheet and tank	13.50 to 14.00
Railroad grate bars	11.00 to 11.50
Machine shop turnings	11.00 to 11.50
Country mixed	12.00 to 13.00
Uncut railroad mixed	13.00 to 14.00
Horseshoes	18.50 to 19.00

New York

NEW YORK, Dec. 31.

Pig Iron.—Active inquiries for pig iron for export continue, but the volume of the business actually placed is small in comparison with the inquiries. It is estimated that about 10,000 tons has been ordered for export during the present month, including several lots of the past week. European conditions are not being counted upon to take any considerable tonnage in the near future, but sellers are looking with more hope to the Far East and to South America. The domestic demand for pig iron is extremely dull. On the very limited tonnages sold, prices are down $3 per ton, but some sellers are refusing to quote lower than the recent Government schedule and no one has abandoned the basing system promulgated Oct. 1. Competition will determine later whether it will be necessary to abandon the basing method established by the Government Oct. 1 in order to help out some of the high-cost furnaces. For the Virginia furnaces the return to the system in vogue before Oct 1 would be very serious and some of them would undoubtedly blow out. We quote prices, as follows, for tidewater delivery for Northern and Southern grades, as follows:

No. 1 X, silicon, 2.75 to 3.25	$38.30
No. 2 X silicon, 2.25 to 2.75	36.55
No 2 plain, silicon, 1.75 to 2.25	35.30
No. 2 X Virginia, silicon, 2.25 to 2.75	39.95
No. 1 Southern (all rail)	39.95
No. 2 Southern (all rail)	38.70

Ferroalloys.—There appears to be no market in ferromanganese or spiegeleisen, and therefore no certain appraisal of values. Some consumers are reported to be offering resale ferromanganese, but their ideas of values are not ascertainable. One report is to the effect that about 50 tons of 80 per cent ferromanganese has been offered at $200, delivered, and it is understood that producers when asked to quote will offer 70 per cent alloy at $225, delivered, or $3 per unit for material above this standard. No confirmation of reports is obtainable in this market that consumers are dissatisfied with the use of 70 per cent alloy and that requests have been made that only 80 per cent be the product hereafter. Spiegeleisen is entirely inactive, with the last quotation at $70, furnace, for any analysis from 16 per cent up. Consumers are apparently well pro-

vided for and no inquiry of any importance is expected until some time in January. The production of manganese alloys in January, it is expected, will by no means approach the record output maintained in the last six months of this year, because a number of furnaces are understood to have either been blown out or changed over to pig iron. Ferrosilicon, 50 per cent, is inactive with quotations nominal at $140 to $150 per ton on contract with spot material from $2.50 to $10 above these levels.

Cast-Iron Pipe.—Buyers are waiting to see what action will be taken in regard to prices, and no business is being transacted. Recent Government prices which still prevail nominally are: $67.70, New York, for 6-in. and heavier; $70.70 for 4-in., $77.70 for 3-in., and $1 additional for Class A and gas pipe.

Old Material.—Railroads which have been offering considerable tonnages of scrap are finding almost no interest on the part of dealers. One road which usually receives 60 or more bids received only four a few days ago on its latest list. In some cases, especially rerolling rails, railroads have sold to dealers at extremely low prices. These do not, however, establish the market, which is to a large extent nominal, owing to the fact that mills are not buying and that transactions among dealers are few. All energies are being devoted to obtaining deliveries before the end of the year in order to prevent further cancellations. We quote buying prices of dealers and brokers, per gross ton, New York, as follows:

Heavy melting steel	$15.50 to $16.00
Rerolling rails	22.00 to 23.00
Relaying rails	58.00 to 60.00
Iron and steel car axles	28.00 to 30.00
No. 1 railroad wrought	27.00 to 28.00
Wrought-iron track	24.00 to 25.00
Forge fire	17.00 to 18.00
No. 1 yard wrought, long	23.00 to 24.00
Light iron	6.00 to 7.00
Cast borings (clean)	13.00 to 14.00
Machine shop turnings	13.00 to 13.50
Mixed borings and turnings	13.00 to 13.50
Iron and steel pipe (1 in. minimum diameter), not under 2 ft. long	21.00 to 22.00
Stove plate	19.00 to 20.00
Locomotive grate bars	19.00 to 20.00
Malleable cast (railroad)	18.00 to 19.00
Old carwheels	24.00 to 25.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, are:

No. 1 machinery cast	$28.00 to $29.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	26.00 to 27.00
No. 1 heavy cast, not cupola size	22.00 to 23.00
No. 1 cast (radiators, cast boilers, etc.)	23.00 to 24.00

Cincinnati

CINCINNATI, Dec. 30—(*By wire*).

Pig Iron.—Reports from reliable sources show that practically no contracting has been done by furnaces in different districts which are willing to take on first half business at $31, furnace. Southern producers are still holding off with the exception of two concerns which have opened their books for such first half business as they are able to take care of. So far the Hanging Rock district furnace operators have held off and are awaiting developments. Sales of prompt iron are very much limited.

Based on freight rates of $3.60 from Birmingham and $1.80 from Ironton, we quote, f.o.b. Cincinnati:

Southern coke, No. 1 foundry and 1 soft	$35.85
Southern coke, No. 2 foundry and 2 soft	34.60
Southern coke, No. 3 foundry	34.10
Southern No. 4 foundry	33.85
Southern gray forge	33.60
Ohio silvery, 8 per cent silicon	49.30
Southern Ohio coke No. 1	34.05
Southern Ohio coke, No. 2	32.80
Southern Ohio coke, No. 3	32.30
Southern Ohio malleable Bessemer	33.30
Basic, Northern	31.80
Standard Southern carwheel	51.60

Old Material.—The market is very weak. Such transactions as are made are on a very low level and in some cases as much as $5 per ton below previous quotations. While dealers' yard stocks are comparatively light, they are unwilling to take on any more scrap, except at bargain figures, and even then are rather slow to accept any large tonnages of metal offered. This somewhat chaotic condition is brought about to some extent by the very low offers for scrap made by large consumers in the Pittsburgh district. These offers are seemingly far apart. For instance, one consumer offers to take a limited amount of heavy melting steel at $20 per gross ton, delivered, and the latest reported sale was made at $21, delivered at consumer's plant. There appears to be no market at all for either cast borings or steel turnings. The following are nominal buying prices f.o.b. cars, Cincinnati and southern Ohio, in carload lots:

Per Gross Ton	
Bundled sheet	$15.00 to $15.50
Old iron rails	24.00 to 25.00
Relaying rails, 50 lb. and up	41.00 to 42.00
Rerolling steel rails	23.00 to 24.00
Heavy melting steel	20.00 to 21.00
Steel rails for melting	20.00 to 21.00
Old carwheels	22.50 to 23.00
Per Net Ton	
No. 1 railroad wrought	$20.00 to $21.00
Cast borings	7.50 to 8.50
Steel turnings	8.00 to 8.50
Railroad cast	20.00 to 21.00
No. 1 machinery	22.00 to 23.00
Burnt scrap	13.50 to 14.00
Iron axles	30.00 to 31.00
Locomotive tires (smooth inside)	28.00 to 28.50
Pipes and flues	15.50 to 16.00
Malleable cast	17.50 to 18.00
Railroad tank and sheet	11.50 to 12.50

Cleveland

CLEVELAND, Dec. 30—(*By wire*).

Iron Ore.—Consumers are showing no interest in the ore market and there is no discussion of prices for 1919. Dock shipments are very light. We quote delivered lower Lake ports as follows:

Old range Bessemer, $6.65; old range non-Bessemer, $5.90; Mesaba Bessemer, $6.40; Mesaba non-Bessemer, $5.75.

Pig Iron.—Numerous requests are still coming from consumers that contracts for unfilled tonnages be revised to the new basis. While consumers intimate that some furnaces have agreed to reduce the contract price $3 a ton, no positive information to that effect has come out and local sellers so far are declining to make the concession demanded. A few requests for cancellations are also being made, largely for iron contracted for before the Government started allocations and shipments of which were prevented because of the war demands. Requests that shipment be held up are fairly plentiful and some producers are piling considerable iron. A few small lot sales of foundry iron were reported both for prompt shipment and for the first half, but new inquiry is light, there being none for steelmaking grades. An inquiry for 15,000 tons of basic has been withdrawn. Consumption has eased off and local foundries are operating at probably not over 75 per cent of capacity. The reduced prices are being quoted by practically all makers on all grades except silvery. On the latter no inquiry has come out to reveal the price attitude of the producers. We quote delivered Cleveland as follows:

Bessemer	$33.60
Basic	30.40
Northern No. 2 foundry	31.40
Southern No. 2 foundry, silicon, 2.25 to 2.75	37.25
Gray forge	30.40
Ohio silvery, 8 per cent silicon	49.90
Standard low phosphorus, Valley furnace	50.00

Coke.—There is a limited demand for by-product foundry coke for prompt shipment, but foundries generally are well supplied with fuel and some requests are being made that shipments of Connellsville coke be held up.

Bolts, Nuts and Rivets.—Some contracts for bolts and nuts are being placed for the first quarter at present prices, which appear firm. Rivet specifications are heavy, but demand is light. Although there are intimations of price shading, the larger rivet manufacturers appear to be holding to regular prices.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
Dec.	Lake	Electrolytic	Tin, New York	New York	St. Louis	New York	St. Louis
26	23.00	23.00	71.50	6.00	5.70	8.25	7.90
27	23.00	23.00	71.50	6.00	5.70	8.10	7.75
28	23.00	23.00	....	6.00	5.70	8.00	7.70
30	23.00	23.00	71.50	6.00	5.70	8.00	7.65
31	23.00	23.00	71.50	6.00	5.70	8.00	7.65

NEW YORK, Dec. 31.

The year closes with all the markets inactive and with both producers and consumers awaiting developments. Copper is offered at 23c. with no buyers. The tin market is very dull. Lead prices have been again reduced. Spelter is stagnant and easy. Antimony has declined.

New York

Copper.—The market is dull and apparently devoid of demand. The interesting event of the past week has been the fixing of a price for export by the Copper Export Association at 23c. per lb. for both Lake and electrolytic, or 3c. under the Government maximum price that has ruled since Aug. 2. Producers are also offering metal to domestic buyers at the same price which we quote as the nominal market. Resale electrolytic has also been offered at 22c. in small quantities. There has been no business, and both producers and consumers are awaiting developments. Buying is expected to develop as the new year progresses and conditions become more stable. Production in 1918 is estimated to have been about 2,000,000,000 lb., as compared with 1,000,000,000 lb. in the year just before the war. Stocks of copper in the country are variously estimated as high as 800,000,000 lb. An organization of brass manufacturers is reported as contemplated to control export trade, similar to that in the red metal.

Tin.—The market is extremely dull. Offerings of Straits tin have been made during most of the week at 71.50c., New York, which we quote as the nominal market, but there have been no buyers. So far as can be learned, there have been very few, if any, orders for tin from the United States Steel Products Co. This indicates a long period of control of the market unless some unusual development takes place. The indications are that this control will be assumed by the War Trade Board from Jan. 1 on, since the War Industries Board ceases to exist on that date. The chief of the tin section of the War Industries Board last week asked the Tin Importers' Association how much of the tin in the hands of the United States Steel Products Co. it was willing to take over at cost so as to make the market, if possible, an open one. The directors of the association replied that they were unwilling to accept any of the metal and incur the loss necessary in such a case. Total tin arrivals to date this month have been 1880 tons, of which 1800 tons came through Pacific ports. The London price as Dec. 24 was £264 per ton for standard spot and £256 for futures.

Lead.—The American Smelting & Refining Co. again reduced its price on Dec. 27 to 6c., New York, or 5.70c., St. Louis, for early delivery, meeting the outside market which had fallen to that level on Dec. 26. Demand, however, continues non-existent. There may be no further recession and the market may steady itself at this level or it may go lower until the law of supply and demand operates. It is not believed that a lower level than 5.50c., New York, will be reached. Resale metal continues to appear. Consumers are heavily stocked and dealers are well supplied.

Spelter.—The market is stagnant, with demand very light and buying of insufficient volume to really test values. Prime Western for January and early delivery is quoted at 7.65c., St. Louis, or 8c., New York, with prompt at about 7.95c., St. Louis, or 8.30c., New York, and scarce. Producers do not seem to be forcing the market and consumers are awaiting developments, particularly galvanizers.

Antimony.—The market is quiet and slightly lower on light demand. Prompt and January wholesale lots are quoted at 7.62½c., New York, duty paid.

Aluminum.—It is understood that the maximum prices for No. 1 virgin aluminum and for scrap will continue in force until March 1, the original date set. These prices are 33c. per lb. for 50-ton lots, 33.10c. per lb. for 15 to 50-ton lots and 33.20c. per lb. for 1 to 15 ton lots.

Old Metals.—Consumers are still refraining from buying and as a result prices have declined further. Dealers' selling prices are nominally as follows:

	Cents Per Lb.
Copper, heavy and crucible	22.50
Copper, heavy and wire	20.50
Copper, light and bottoms	17.00
Brass, heavy	14.00
Brass, light	10.50
Heavy machine composition	20.00
No. 1 yellow rod brass turnings	11.00
No. 1 red brass or composition turnings	16.50
Lead, heavy	5.50
Lead, tea	4.50
Zinc	5.50

Chicago

CHICAGO, Dec. 30.

In copper and lead business is confined to routine requirements, which are filled without much study of the market. Lead is down a few points and some copper sales are reported at concessions from the producer's price of 23c. In tin there is very little movement at the Government price, but plenty is available. Spelter is dormant. Proportionately antimony is more active than any of the other metals. The market has a holiday aspect. We quote copper at 23c. for carloads; tin, 75c. to 77c.; lead, 5.80c.; spelter, 8.12½c.; antimony, 9.50c. to 10c. On old metals we quote copper wire, crucible shapes, 15.50c.; copper clips, 15c.; copper bottoms, 14c.; red brass, 15c.; yellow brass, 10c.; lead pipe, 4.25c.; zinc, 4.50c.; pewter, No. 1, 30c.; tinfoil, 35c.; and block tin, 45c.

St. Louis

Dec. 30.—The non-ferrous metal markets are winding up the year in the dumps, with lead in carloads quoted at 6.75c., but no business, and spelter at 8.10c. and also without demand. In less than carloads, the quotations made are: Lead, 7.50c.; spelter, 9.25c.; tin, 72½c.; copper, 27.50c.; Asiatic antimony, 10c. In the Joplin district, ores are very weak, some of the top grade ore for sheet zinc makers selling at $55. Second grade ores are selling down as low as $40 per ton, with the average for the week for the district at $45 per ton, basis of 60 per cent metal, because of the preponderance of low grade ores sold. Calamine has been quiet, ranging from $30 to $40 per ton, basis of 40 per cent metal and the average for the week for the district was $34 per ton. Lead ore, basis of 80 per cent metal, has been weak and nominally $65 per ton, but the sales have been few and the average for the week for the district was held at $80. On miscellaneous scrap metals, we quote dealers' buying prices as follows: Light brass, 9c.; heavy yellow brass, 11c.; light copper, 15c.; heavy copper and copper wire, 17c.; heavy red brass, 16c.; pewter, 40c.; tinfoil, 48c.; tea lead, 5c.; lead, 5c.; zinc, 4.50c.; aluminum, 19c.

According to figures compiled by William J. Fairbairn, secretary and manager Milwaukee Metal Trades and Founders' Association, the value of the product of iron, steel and machinery in the Milwaukee district during 1918 was $155,696,044, compared with $107,802,063 in 1917. This is an increase of $47,893,981, or approximately 44 per cent. The number of shops in the industry increased from 97 to 103 and the capital employed increased from $60,839,032 in 1917 to $77,272,493 in 1918. The number of employees durjng the past year averaged 30,023, compared with 26,082 in 1917. The total wages paid were $37,833,405, or an average of more than $1,200 per person per annum, the highest on record.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight rates from Pittsburgh on finished iron and steel products, including wrought iron and steel pipe, with revisions effective Nov. 1, 1918, in carloads, to points named, per 100 lb., are as follows: New York, 27c.; Philadelphia, 24.5c.; Boston, 30c.; Buffalo, 17c.; Cleveland, 17c.; Cincinnati, 23c.; Indianapolis, 25c.; Chicago, 27c.; St. Louis, 34c.; Kansas City, 59c.; St. Paul, 49½c.; Denver, 99c.; Omaha, 59c.; minimum carload, 36,000 lb. to four last named points; New Orleans, 38.5c.; Birmingham, 57.5c.; Pacific Coast, $1.25; minimum carload, 80,000 lb. To the Pacific Coast the rate on steel bars and structural steel is $1.315, minimum carload 40,000 lb.; and $1.25, minimum carload 50,000 lb. On wrought iron and steel pipe the rate from Pittsburgh to Kansas City is 50c. per 100 lb., minimum carload 46,000 lb.; to Omaha, 50c., minimum carload 46,000 lb.; to St. Paul and Minneapolis, 49.5c., minimum carload 46,000 lb.; Denver, 99c., minimum carload 46,000 lb. A 3 per cent transportation tax applies. On iron and steel items not noted above, rates vary somewhat and are given in detail in the regular railroad tariffs.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in. angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, structural sizes, 2.80c.

Wire Products

Wire nails, $3.50 base per keg: galvanized, 1 in. and longer, including large-head barb roofing nails taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire, $3.35 per 100 lb.; annealed fence wire, Nos. 6 to 9, $3.25; galvanized wire, $3.95; galvanized barb wire and fence staples, $4.35; painted barbed wire, $3.65; polished fence staples, $3.65; cement-coated nails, $3.40 base; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 47 per cent off list for carload lots, 46 per cent for 1000-rod lots, and 45 per cent off for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets	$4.40 base
Large boiler rivets	$4.50
7/16 in. x 6 in. smaller and shorter rivets	50-10 per cent off list
Machine bolts h.p. nuts, ⅜ in. x 4 in.:	
Smaller and shorter, rolled threads	50-10-5 per cent off list
Cut threads	50-5 per cent off list
Larger and longer sizes	40-10 per cent off list
Machine bolts, c.p.c. and t. nuts, ⅜ in. x 4 in.:	
Smaller and shorter	40-10 per cent off list
Larger and longer	35-5 per cent off list
Carriage bolts, ⅜ x 6 in.:	
Smaller and shorter, rolled threads	50-5 per cent off list
Cut threads	40-10-5 per cent off list
Larger and longer sizes	40 per cent off list
Lag bolts	50-10 per cent off list
Plow bolts, Nos. 1, 2, 3	50 per cent off list
Hot pressed nuts, sq., blank	2.50c. per lb. off list
Hot pressed nuts, hex., blank	2.30c. per lb. off list
Hot pressed nuts, sq., tapped	2.30c. per lb. off list
Hot pressed nuts, hex., tapped	2.10c. per lb. off list
C.p.c. and t. sq. and hex. nuts, blank	2.25c. per lb. off list
C.p.c. and t. sq. and hex. nuts, tapped	2.00c. per lb. off list
Semi-finished hex. nuts:	
⅝ in. and larger	60-10-10 per cent off list
9/16 in. and smaller	70-5 per cent off list
Stove bolts	70-10 per cent off list
Stove bolts	2½ per cent extra for bulk
Tire bolts	50-10-5 per cent off list

The above discounts are from present lists now in effect. All prices carry standard extras.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, $57; chain rods, $65; screw, rivet and bolt rods and other rods of that character, $65. Prices on high carbon rods are irregular. They range from $70 to $80, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes 9/16 in. x 4½ in. and heavier, per 100 lb., $3.70, in lots of 200 kegs of 200 lb. each, or more; track bolts, $4.90. Boat spikes, $5.05 per 100 lb., f.o.b. Pittsburgh.

Terne Plate

Prices of terne plate are as follows: 8-lb. coating, 200 lb., $14.50 per package; 8-lb. coating, I. C., $14.80; 12-lb. coating, I. C., $16.50; 15-lb. coating, I. C., $17.50; 20-lb. coating, I. C., $18.75; 25-lb. coating, I. C., $20.00; 30-lb. coating, I. C., $21.00; 35-lb. coating, I. C., $22.00; 40-lb. coating, I. C., $23.00 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.70c. from mill. Refined iron bars, $5.60c.; common iron bars, 3.50c. in carload and larger lots, f.o.b. mill.

Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card.

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛, ¼ and ⅜	47	20½	⅛ and ¼	26	+1
½	51	36½	⅜	27	List
¾ to 3	54	40½	½	31	13
			¾ to 1½	36	20

Lap Weld

2	47	34½	1¼	21	6
2½ to 6	50	37½	1½	28	14
7 to 12	47	33½	2	29	15
13 and 14	37½	..	2½ to 6	31	18
15	35	..	7 to 12	28	15

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	43	25½	⅛, ¼ and ⅜	25	8
½	48	35½	½	30	17
¾ to 1½	52	39½	¾ to 1½	36	21
2 to 3	53	40½			

Lap Weld, extra strong, plain ends

2	45	33½	1¼	22	7
2½ to 4	48	36½	1½	28	14
4½ to 6	47	35½	2	30	17
7 to 8	43	29½	2½ to 4	32	20
9 to 12	38	24½	4½ to 6	31	19
			7 to 8	23	11
			9 to 12	18	6

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers have been seven (7) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe have been nine (9) points lower (higher price).

Boiler Tubes

The following are the prices for carload lots, f.o.b. Pittsburgh:

Lap Welded Steel		*Charcoal Iron*	
3½ to 4½ in.	37	3½ to 4½ in.	12½
2½ to 3¼ in.	27	3 to 3¼ in.	+ 2
2¼ in.	20½	2½ to 2¾ in.	+ 4½
1¾ to 2 in.	16	2 to 2¼ in.	+19½
		1¾ to 1⅞ in.	+32

Standard Commercial Seamless—Cold Drawn or Hot Rolled

Per Net Ton		Per Net Ton	
1 in.	$334	1¾ in.	$214
1¼ in.	274	2 to 2½ in.	184
1⅜ in.	264	2¾ to 3¾ in.	174
1½ in.	214	4 in.	194
		4½ to 5 in.	214

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department, which will be subject to special negotiation.

Sheets

Makers' price for mill shipments on sheets of United States standard gage in carload and larger lots are as follows:

Blue Annealed—Bessemer	Cents per lb.
No. 8 and heavier	3.85
Nos. 9 and 10 (base)	3.90
Nos. 11 and 12	3.95
Nos. 13 and 14	4.00
Nos. 15 and 16	4.10
Box Annealed, One Pass Cold Rolled—Bessemer	
Nos. 17 to 21	4.50
Nos. 22 and 24	4.55
Nos. 25 and 26	4.60
No. 27	4.65
No. 28 (base)	4.70
No. 29	4.80
No. 30	4.90
Galvanized Black Sheet Gage—Bessemer	
Nos. 10 and 11	5.05
Nos. 12 and 14	5.15
Nos. 15 and 16	5.30
Nos. 17 to 21	5.45
Nos. 22 and 24	5.60
Nos. 25 and 26	5.75
No. 27	5.90
No. 28 (base)	6.05
No. 29	6.30
No. 30	6.55
Tin-Mill Black Plate—Bessemer	
Nos. 15 and 16	4.50
Nos. 17 to 21	4.55
Nos. 22 to 24	4.60
Nos. 25 and 27	4.65
No. 28 (base)	4.70
No. 29	4.75
No. 30	4.75
Nos. 30½ and 31	4.80

PERSONAL

J. Edward Grinfield-Coxwell, for a number of years manager of the Eastern sales department of the Columbia Steel & Shafting Co., Pittsburgh, started in business for himself Jan. 1, with offices in the Marshall Building, 40 Central Street, Boston, and will handle special accounts in cold finished steels. Mr. Coxwell came to this country when a young man, entering the employ of Park Brothers & Co., Ltd., now the Crucible Steel Co. of America, as office boy in Boston. Later he became salesman and joined the forces of the Compressed Steel Shafting Co., Boston, remaining with it a number of years before becoming Eastern manager of the Columbia company.

Frank Pyle has resigned as superintendent of the plate mill of the Brier Hill Steel Co., Youngstown, Ohio, and will be succeeded by William H. Eshleman, superintendent of the 72-in. plate mill of the Sharon Steel Hoop Co. To succeed Mr. Eshleman the Sharon Steel Hoop Co. has named Frank C. Walker head of its mill. Mr. Walker has been engaged in plate mill operations 25 years and has been with the Brier Hill Steel Co. for the past six months.

Laurence Howard, representing A. W. Pidwell of Paris, importer and dealer in machinery and other equipment for shipyards, mines and other industries, has arrived in the United States to make purchases. He has established temporary residence at 344 West Seventy-second Street, New York. The purchases he expects to make will include machinery for shipbuilding, mining machinery, pumps, gas engines, etc.

Cyrus H. McCormick retired as president of the International Harvester Co., Dec. 26, and became chairman of the board of directors. On the same day his brother, Harold F. McCormick, was elected president.

On Dec. 21 J. G. Butler, Jr., Youngstown, Ohio, celebrated the 78th anniversary of his birth. Mr. Butler received hundreds of congratulatory messages.

Frank D. Zug has been elected treasurer of the Ohio Iron & Steel Co., operating Mary furnace at Lowellville, Ohio, to succeed David Davies, who has been secretary and treasurer of the company, and will continue as its secretary.

Willard A. Johnson, formerly connected with the sales organization of the National Acme Co., Cleveland, has been appointed to direct sales for A. H. & F. H. Lippincott, Inc., Philadelphia, screw machine product and metal specialty manufacturer.

W. F. Singer, formerly assistant manager of the tin plate department of the Weirton Steel Co., Weirton, W. Va., has been made assistant to the third vice-president of the same company.

George H. Blakely, president of the Bethlehem Steel Bridge Corporation, Bethlehem, Pa., has been appointed a member of the Bethlehem Bridge Commission, succeeding J. S. Krause.

W. E. Porter, for the past five years assistant chief of the Smoke Department of the Department of Public Health, Pittsburgh, has been appointed chief of the bureau to succeed J. W. Henderson, deceased.

William A. Patton, assistant to the president of the Pennsylvania Railroad Co., and president of the New York, Philadelphia & Norfolk Railroad Co., on Dec. 31 retired from the active service of the Pennsylvania Railroad System, under the provisions of the pension plan. On that date he completed 53 years and 11 months of continuous employment.

Frederick A. Scheffler, for some time identified with the New York offices of the Babcock & Wilcox Co., has become associated with the Fuller Engineering Co., and will make his headquarters at that company's New York office, 50 Church Street. The Fuller company is making a specialty of applying pulverized coal methods of firing to boilers for power generation.

S. G. Cooper and George L. Claypool of the pig iron firm of Banning, Cooper & Co., Ltd., Oliver Building, Pittsburgh, which recently dissolved and liquidated, have formed a new partnership under the name of Cooper, Claypool & Co., Ltd., to carry on the business as formerly in steel, pig iron and coke, with offices in room 1407 Oliver Building, Pittsburgh.

George N. Crispin, secretary of the Tindel-Morris Co., Eddystone, Pa., has resigned. He has served the Tindel-Morris Co. first as accountant, then as assistant secretary and purchasing agent, succeeding to the office of secretary in 1904. He served on the board of directors of that company for 15 consecutive years.

J. H. Schoenly, assistant manager of steel sales, of Simonds Manufacturing Co., New York, has resigned from this position and will become manager of domestic steel sales of the firm of Josef F. A. Comstedt, 120 Broadway, Equitable Building, New York, from Jan. 1, 1919.

Morris L. Cooke, Horace K. Hathaway, Boyd Fisher, Clyde L. King, Keppele Hall and John H. Williams have opened an office as consulting engineers in management in the Finance Building, South Penn Square, Philadelphia.

President McAteer and Vice-president McElhany of the American Steel Export Co., New York, gave a dinner to their employees and business friends at the Waldorf-Astoria Hotel, New York, Dec. 28.

Arthur A. Fowler, New York, partner of Rogers, Brown & Co., sailed on the Baltic, Dec. 30, for Liverpool, and will spend several months in England, France and other European countries.

Frank Purnell has resumed his duties in the sales department of the Youngstown Sheet & Tube Co., Youngstown, Ohio, returning from Washington, where he was assistant to J. Leonard Replogle, director of steel supply.

OBITUARY

DUDLEY GREGOR GAUTIER, president Tacony Steel Co., Tacony, Pa., and vice-president of J. H. Gautier & Co., crucible makers, Jersey City, N. J., also head of D. G. Gautier & Co., 50 Church Street, New York, died at his home in New York last week, after a brief illness. He was 71 years old. Mr. Gautier engaged in the steel business in 1880, when he established the Lafayette Steel Works at Jersey City. This plant had a rolling mill, which was later acquired by the Cambria Steel Co. and operated for a number of years as the Gautier steel department of that company. Mr. Gautier had a home at 32 Fifth Avenue, New York, and also a country place at Hempstead, Long Island. He was a member of the Union, Metropolitan, Down Town and New York Yacht clubs, and the Huguenot Society. He was unmarried.

ROY H. SHAW, general manager Ohio Steel Foundry Co., Akron, Ohio, died of influenza, in that city, on Dec. 14, at the age of 30 years. He was the son of J. George Shaw, a well-known steel founder of Milwaukee and principal owner of the Akron concern. The funeral was held in Milwaukee on Dec. 17.

JAMES MOIR HEGGIE, director and assistant general manager of James G. Heggie & Sons, Inc., Joliet, Ill., founders, died Dec. 9, and his sister, Miss Jeanette M. Heggie, who had been his secretary and had taken an active part in the business, died on Dec. 11, both from influenza.

JAMES E. KELLY, Canandaigua, N. Y., for the past eight years superintendent of the Lisk Mfg. Co. plant in that city, died of pneumonia Dec. 19, at the age of 49 years. He was at one time superintendent of the plant of the Atlantic Stamping Co. at Rochester, N. Y.

JULIUS KUEHN, secretary and treasurer B. Hoffmann Mfg. Co., Milwaukee, founder and machinist, died Dec. 21, at the age of 73 years.

JOSEPH BARRY, sales manager for the Air Reduction Co., New York, died at his home in that city Dec. 23.

New Iron and Steel Works Construction

(*Continued from page* 71)

West Leechburg Steel Co.

The West Leechburg Steel Co., Pittsburgh, added to its equipment in 1918 a battery of 3000 hp. Union boilers with Murphy stokers and coal conveying machinery and a 1500 kw. General Electric mixed pressure turbine and rotary converter, together with steel and brick buildings. The company also added five 30-ton Bradley gas producers with coal conveying machinery for the open-hearth furnaces.

Trumbull Steel Co.

The Trumbull Steel Co., Warren, Ohio, in 1918 completed and put in operation its new open-hearth plant consisting of seven 100-ton furnaces, the last two of which were put in operation in October. It also completed and put in operation a 36-in. two high blooming mill and an 18-in. sheet bar and billet mill.

Page Steel & Wire Co.

The Page Steel & Wire Co., Monessen, Pa., in 1918 added Morgan mechanical gas producers to its open-hearth department which was formerly supplied with natural gas and also improved its boiler plant by installing overfeed stokers operated with modern forced draft. To the wire drawing equipment 112 wire drawing blocks were added, increasing the productive capacity of the department about 50 per cent.

Andrews Steel Co.

The Andrews Steel Co., Newport, Ky., in 1918 completed and put in operation two basic 100-ton open-hearth furnaces, the addition of five Morgan gas producers to its gas producer building, additional coal crushing handling machinery, two 1000-hp. boilers to its boiler house, two new 3750-hp. Westinghouse turbines and generators, and a new shell steel billet yard building was constructed.

Lackawanna Steel Co.

The Lackawanna Steel Co., Buffalo, completed and put in blast in 1918 two new blast furnaces having an annual production of approximately 360,000 tons of pig iron.

Donner Steel Co.

The Donner Steel Co., Buffalo, completed in 1918 one 75-ton open hearth furnace, an 18-in. billet mill and a 14-in. bar mill. It also added two 600-ton mixers and built a shipping warehouse. For completion in 1919 it has under construction a 1200-ft. ore dock and an 8-in. and a 10-in. bar mill.

Pacific Coast Steel Co.

The Pacific Coast Steel Co., Seattle, Wash., added and put in operation in 1918 a 40-ton open-hearth furnace at its Seattle plant, and also a 40-ton open-hearth furnace at its San Francisco plant. At its Portland, Ore., plant the company is building two 40-ton open-hearth furnaces, and a combination 14-in. and 9-in. mill which it expects to complete in 1919.

Keystone Steel & Wire Co.

To its plant, as described in the Jan. 3, 1918, issue of THE IRON AGE, the Keystone Steel & Wire Co., Peoria, Ill., in the year has added a third 75-ton open-hearth furnace. It has also made a proportionate increase in its soaking-pit capacity. It does not contemplate any new plans or additions to the plant in 1919.

Brier Hill Steel Co.

The Brier Hill Steel Co., Youngstown, Ohio, completed and placed in operation on Sept. 21, 1918, a new 500-ton blast furnace. It completed and started in December a new plate mill unit consisting of one 84-in. jobbing mill and one 132-in. plate mill. The capacity of this unit will be 25,000 tons of finished product per month.

Follansbee Brothers Co.

Follansbee Brothers Co., Pittsburgh, last year installed one additional 40-ton basic open-hearth furnace, making its present melting equipment four furnaces of practically uniform capacity. This company also installed and placed in operation in December a complete plant to utilize powdered coal as fuel in place of natural gas, this installation being applicable to open-hearth furnaces, ingot furnaces, sheet and pair furnaces, annealing furnaces, etc. No new construction is under way or planned for 1919.

Colorado Fuel & Iron Co.

The Colorado Fuel & Iron Co. at its Minnequa steel works, Pueblo, Col., completed in 1918 two batteries containing 120 Koppers by-product coke ovens, a spiegeleisen melting plant in connection with its open-hearth steel department, and a flue dust sintering plant at its blast-furnace department. It contemplates no new construction in 1919.

Witherbee, Sherman & Co.

With regard to new construction or improvements during 1918, Witherbee, Sherman & Co., New York, state that no extensive development has been undertaken such as to materially increase the productive capacity of the mines, which remains about as in the past: approximately 1,250,000 tons of crude ore, capable of producing approximately 900,000 tons of concentrates.

The principal new addition to mining operations completed in 1918 was the opening up of the old New Bed body which had remained unworked since the early '80s. The New Bed body is a continuation of the Barton Hill body of low phosphorus ore to the south. The old workings have been reopened by enlarging the old Thomas shaft, putting in double tracks down the slope for 400 ft., a 150-hp. double drum Nordberg electric hoisting engine, and a 1000-ton bin over the tracks leading from Barton Hill tunnel to No. 4 mill.

In the Harmony mine the high prices and scarcity of labor have been successfully combated by the introduction of shovels and mechanical loaders. By these means production in this mine has been kept up at times when, had man power been relied upon, the mine would have been practically closed. The results as to costs have also been better than by man power.

At No. 3 concentrating mill experiments have been conducted during the year to clear the mill of dust and has finally resulted in the installation of a Sturtevant de-dusting system, similar to those installed in cement mills.

The recovery of apatite for fertilizer purposes as a by-product from the tailings piles has been developed successfully and has resulted in the establishment of a fertilizer department with Edmund Mortimer of Grafton, Mass., in charge of sales. A new fertilizer mill was erected and put in operation the first half of the year, having a capacity of 50 tons of fertilizer per day.

A housing development was laid out and houses for 20 families built during the year, of stucco and shingle, designed to meet the requirements of the American employees.

OTHER STEEL WORKS ADDITIONS

The Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., in 1918 added an extension to its iron foundry, 60 x 135 ft., and one to its steel foundry, 70 ft. long, one bay of which is 50 ft. 3 in. from center to center of rails and the other 60 ft., making available approximately 16,000 more square feet. In connection with the new bays the company added a 35 and a 10-ton crane and an additional 30-ton open-hearth furnace in the steel foundry, and another 52-in. cupola in the iron foundry. An outside crane runway for unloading and storing raw material for the iron foundry was also completed. This runway was 173 ft. long and 50 ft. wide

and is equipped with a 5-ton Shepard monorail for unloading raw material from the cars and charging it direct into the cupola or storing it under the runway. In connection with this runway concrete bins for storing sand, coal, coke and scrap have been built. This extension gives the company almost three acres of floor space under one roof and increases the capacity of both the iron and steel foundries materially.

The American Steel Foundries, Chicago, made no important improvements in 1918 except the addition to its Alliance works, Alliance, Ohio, of a foundry building 75 x 600 ft.

The Central Steel Co., Massillon, Ohio, is making a number of extensions to its plant. These will include 23 additional gas producers, two additional soaking pits; additional boiler house equipment, including stokers; a coal and ash handling plant and a water purifying system.

The Adamson Machine Co., Akron, Ohio, constructed in 1918 a new pattern shop, 50 x 100 ft., one story and basement, and has started an addition to its steel foundry which will be 100 x 200 ft.

Reading Steel Casting Co., Reading, Pa., erected and put in operation in 1918 a 20-ton acid open-hearth furnace. It also added to its equipment a new power house and other additions amounting to 12,000 sq. ft. of floor space, with the usual necessary cranes, molding machines, drying ovens and other foundry equipment.

The Warren Steel Casting Co., St. Louis, completed in 1918 the installation of a 5-ton McClain-Carter open-hearth furnace and a 3-ton electric furnace.

The Allegheny Steel Co., Pittsburgh, in 1918 added 15 gas producers to its equipment.

NEW ROLLING MILL WORK

Expansion in rolling mill capacity in 1918 in the United States was not large, most companies being rushed in turning out material needed for war purposes.

Weirton Steel Co.

The Weirton Steel Co., Weirton, W. Va., formerly the Phillips Sheet & Tin Plate Co., in 1918 installed a 10-in. hot mill for the manufacture of hot rolled strip steel. The company is now erecting and hopes to complete in a few months a 600-ton blast furnace for the production of pig iron.

Interstate Iron & Steel Co.

The Interstate Iron & Steel Co. has improved conditions at its South Chicago works by erecting a billet chipping and storage building, 80 x 700 ft., equipped with two traveling cranes. It has also remodeled its soaking pits, enlarged a machine shop and electrified a rod mill.

Calumet Steel Co.

The Calumet Steel Co. has added no additional rolling capacity in the year, but has built a fence post department at its plant at Chicago Heights, Ill., with a capacity of 10,000 fence posts per day. The posts will be manufactured from the company's own steel formerly sold to the trade.

Other New Rolling Mill Work

The Liberty Steel Co., Warren, Ohio, placed in operation in 1918 its new plant of eight tin mills. The original plans called for the addition of four other mills, but it has not yet been decided whether this will be carried out in the new year.

The Pennsylvania Steel & Iron Corporation, Lancaster, Pa., contemplates adding in 1919 four heating furnaces to its 8 and 10-in. mill, two to each mill, and a new building for the 8-in. mill, the total expenditure approximating $60,000.

Ohio Falls Iron Co., New Albany, Ind., added in 1918 a new 10-in. three-high guide mill with a 12-in. Belgian roughing tandem mill complete with two coal-fired furnaces, hot beds, shears, etc.

The George W. Armstrong & Co., Inc., Fort Worth, Tex., installed in 1918 extensive machinery for the manufacture of oil well supplies such as swedge nipples, bull plugs, sucker rods, pull rods, pump jacks, etc.

The Mansfield Sheet & Tin Plate Co., Mansfield, Ohio, installed in 1918 a large plant for pulverizing coal on the Hollbeck system.

BLAST FURNACE WORK

The Thomas Iron Co., Hokendauqua, Pa., in 1918 repaired and relined all of its blast furnaces except one, all of which were expected to be in blast the middle of December. The principal improvements aside from this during the year were the addition of new boiler plants and gas mains at Alburtis and Hellertown as well as additional blowing-engine capacity at both plants. Hellertown furnace No. 11 was raised 6 ft. in height and entirely relined and refitted, No. 10 furnace at this plant being dismantled. Additional hot-blast equipment was installed at No. 11 furnace. The total furnace capacity of the company is now over 22,000 tons per month. In 1919 the company contemplates the construction of a new boiler plant and a plant to treat boiler water as well as the installation of pig-casting machine at Hokendauqua furnaces. The Richard mine at Wharton is being improved by the installation of new equipment throughout, a new shaft 950 ft. deep is being completed, a new concentrating mill installed and a system of electric haulage underground will soon be in operation. The mine is entirely served by electrically operating pumps, hoisting engine, air compressor and an underground railroad system. The steam plant is held in reserve only for emergencies. The estimated capacity of the mine is 150,000 tons of ore annually.

A large force of men is rushing to completion the Ford plants on the River Rouge, Detroit, which will be the center of an enterprise which will eventually absorb $50,000,000. Already $10,000,000 has been expended on the work. By Feb. 15 the coke oven and by-product plant, it is expected, will be producing 12,000,000 ft. of gas daily. The first of the two blast furnaces is nearing completion, and the foundation for the second has been laid. The three hot-blast stoves of No. 1 furnace are up. The furnaces will each have a daily capacity of 600 tons. A foundry 264 x 968 ft. will be constructed near the furnaces. Two Hulette boat unloaders and ore and conveying bridges have been completed. A power plant to cost $2,500,000, and equipped with 12,000 and 20,000-kw. turbine generators, and a steam-driven reciprocating engine, will be constructed in the spring, as will the pig-iron storage building, in which the surplus production from the furnaces will be stored for the market. It is planned to have the entire works in operation by the fall of 1919, when between 5000 and 10,000 men will be given employment. Ore will be transferred from Lake Superior mines to the furnaces in boats built at the Ford Eagle plant. From the River Rouge works the rough parts for Ford automobiles, tractors and trucks will be shipped to the various assembling plants. The East will be reached by the Erie Canal, and boats constructed in the Eagle plant will do the transferring.

The Virginia Iron, Coal & Coke Co., Roanoke, Va., in 1918 repaired and relined its No. 1 furnace at Middlesboro, Ky., which went into blast last March and is now repairing and relining its No. 2 furnace at the same place, which should be ready for operation in February, 1919. The company's furnace at Max Meadows, Va., was repaired and relined and went into blast in November. The Crozer furnace at Roanoke, Va., was shut down for repairs and relining about the middle of December and will go into blast again about the first of February.

The Marting Iron & Steel Co., Ironton, Ohio, in 1919 will equip its Ironton stack with a skip hoist and a McKee top, material for which is already on the ground. The furnace is to be relined and will probably go into blast early in the spring, the improvements being of such a nature that the production will approximate 350 tons a day.

The Belfont Iron Works Co., Ironton, Ohio, is preparing to install in the first quarter of 1919 a gas washer at its blast furnace plant as well as two new stoves. A slag pit will be provided and it is expected that the output will be increased about 50 per cent.

The Jackson Iron & Steel Co., Jackson, Ohio, erected

a new cast-house crane, a new machine shop and a general supply house, together with other minor improvements.

The Cleveland Furnace Co., Cleveland, in 1918 installed a new pig-casting machine, built a ladle-cleaning house and relined and enlarged its No. 2 furnace, increasing the hearth from 15 to 17 ft. This is estimated to bring the daily capacity from 400 to 500 tons.

The Alan Wood Iron & Steel Co., Philadelphia, completed and put in operation in 1918 a 500-ton blast furnace which it began building in 1917, making the commany's total number of furnaces three.

The A. M. Byers Co., Pittsburgh, relined and generally repaired its blast furnace at Girard, probably increasing the capacity about 25 per cent. The company contemplates nothing definite in new construction in 1919.

The Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., in 1918 erected a by-product coke plant consisting of 120 Semet-Solvay ovens.

NEW CANADIAN CONSTRUCTION

The Dominion Iron & Steel Co., Ltd., Sydney, in 1918 has rebuilt and put in operation one blast furnace, increasing its capacity from 250 to 350 tons per day. One battery of 60 Koppers coke ovens has been put in operation and the second battery is expected to be ready early in 1919. The company has also under construction a 110-in. plate mill and considerable new electrical equipment to provide power for the new mill.

The Steel Co. of Canada, Ltd., Hamilton, has completed and put in operation in 1918, 80 by-product Wilputte coke ovens for the production of blast furnace, foundry and domestic coke.

Algoma Steel Co., Ltd., Sault Ste. Marie, completed and blew in in March, 1918, its No. 4 blast furnace with a capacity of 150,000 tons of pig iron per year. It also completed a battery of 25 Wilputte coke ovens which were placed in operation in October, 1918, having a capacity of 350 tons of coke per day. A new plant for the manufacture of silica brick was completed, having a capacity of 5000 bricks per day. An additional coal-handling bridge for coke-oven coal was erected and an electrical repair-shop building was constructed. There were no additions during the year to the steelmaking department of the plant. A second battery of 25 coke ovens is under construction and it is expected they will be ready for operation in February, 1919. The company has also awarded a contract for the completion of its ore dock, which will be built in the summer of 1919. The addition of concrete construction will be 326 ft. long, which, with the 1406 ft. already constructed, will make the ore dock of concrete construction 1732 ft. long.

Steel Barge Contract Will Not Be Canceled, Says Director General McAdoo

ST. LOUIS, Dec. 31.—Reports to the effect that work might be stopped on the $6,000,000 contract for steel barges and towboats for the federally operated Mississippi and Warrior River barge lines have been officially denied in a telegram from Director General McAdoo to Jackson Johnson, president of the St. Louis Chamber of Commerce.

Mr. McAdoo's reply to the St. Louis Chamber of Commerce said in part:

"There is no truth in the report that the contracts for the barges for the Mississippi River have been cancelled.

"It is proper that I should call your attention to the fact, however, that unless Congress shall extend the period of federal control so that a reasonable opportunity may be afforded for a fair test of the value of unified railroad operations along with co-ordinated inland waterways operation, the experiment on the Mississippi River may not hold out much promise.

"I doubt if the Mississippi River operation can produce satisfactory results if the railroads should be turned back soon to private control. The old methods of railroad competition with waterways transportation will be revived, and it is probable that the waterways experiment may not be able to survive that competition."

Improvements of Sligo Iron & Steel Co.'s Plant

The Sligo Iron & Steel Co. plant of Connellsville, Pa., recently purchased by the interests controlling the Federal Export Corporation, 42 Broadway, New York, is one of the oldest plants in the United States, having been established in 1823. Since the purchase by its present owners improvements have been made and new equipment installed, and it is expected that other improvements will be made.

At the present time the plant has a 9-in. and 16-in. mill; a 60-in. plate mill; also a 20-in. muck mill; with a puddling department of 19 furnaces and additional furnaces are being planned. A new crane runway will be installed. A new cooling bed has been installed on the muck mill and cranes with magnets are handling the finished products. The hot beds of the 9-in. and 16-in. mill have been rebuilt and machinery is being installed at the hot bed and shears to handle finished bars. The shearing facilities on the plate mill have been improved. Preparation has been made to build a warehouse 70 x 300 ft., which will be served with cranes that will take the finished bars direct from the shears to the warehouse or to the cars. A new machine shop and roll shop are being built and a piling department is being installed, which will be served with overhead cranes.

As announced recently in THE IRON AGE, W. P. Mullane is the general superintendent of the plant, of which the entire personnel has been changed since the new ownership. Fred Donaldson is in charge of the puddling department. Robert Finnie of Youngstown, Ohio, has taken charge of the roll designing and turning department. The plate mill, which has been occupied in rolling for Government business, is now in charge of Thomas Evans. The production of the mill has greatly increased within the past three months, and shipments are going out both to the domestic trade and to fill overseas orders.

Calumet Association Launched

The Calumet Manufacturers' Association was organized recently at the Auditorium Hotel, Chicago, by representatives of about 80 manufacturing industries of South Chicago, Pullman, Grand Crossing, Burnside, West Pullman, Harvey, Hegewisch, Hammond, East Chicago, Indiana Harbor, Whiting and Gary.

William M. Ryan of the Ryan Car Co. acted as chairman. Following various addresses on the importance of the proposed organization a nominating and prospectus committee was appointed which recommended a ticket to be voted upon at the next meeting as follows:

President, W. B. Conkey, W. B. Conkey Co., Hammond.

Vice-President, Albert Mohr, John Mohr & Sons, South Chicago.

Secretary, Henry W. Lee, *The Calumet Record*, South Chicago.

Directors, Silas J. Llewellyn, Interstate Iron & Steel Co., Chicago and East Chicago; William M. Ryan, Ryan Car Co., Hegewisch; L. M. Vilas, The Buda Co., Harvey; A. C. Clark, A. C. Clark & Co., Grand Crossing.

The committee also submitted a prospectus which declares the purposes of the Calumet Manufacturers' Association to be: The industrial development of the Calumet region as affected by transportation, navigation, sanitation and other public improvements, welfare work, general labor employment, housing facilities and co-operation in other matters concerning the welfare of the district and its industries.

At Youngstown, Ohio, the sheet mills of the Sharon Steel Hoop Co., Trumbull Steel Co., Brier Hill Steel Co., Republic Iron & Steel Co., and Youngstown Sheet & Tube Co., that were idle over the Christmas week and were generally repaired, resumed this week. Tin mills at Trumbull are idle for the week of New Year's.

The Philadelphia Steel & Iron Co., Philadelphia, manufacturer of forgings, is arranging to increase its output very materially by an addition to its plant at Thirty-third Street and Gray's Ferry Road, that city. The new building will be 40 x 100 ft., and new equipment will be purchased for it.

NEW STEEL PLATE EXTRAS

Important Departure in Charge for Lighter Than ¼-In. Thickness

A new card of extras on steel plates has been announced by the Midvale Steel & Ordnance Co., to take effect Jan. 1, and a number of other plate makers have already adopted the scales. The important point of departure from former classifications is that the extra for plates thinner than ¼ in. is to be a percentage of the base price and not a flat sum. For example, a 3/16-in. plate would carry an extra of 10 per cent of the base, instead of 0.10c. per lb. With plates at 3c. per lb., the extra would thus be 0.30c., making the price 3.30c., instead of 3.10c., as under the former schedule. The point is made that under present costs of manufacture the flat extra was too little and 3/16-in. and lighter plates have been unprofitable. Some change in the existing classification was necessary incidentally, because in arranging for charging for waste in turning out sketch plates the allowance referred to the Government price of steel scrap. As no such controlled price now exists, the interesting expedient was resorted to of evaluating the waste material in terms of the finished plate price, as noted below. The extras are as follows:

Conditions

Rectangular plates, tank steel, ¼ in. thick and over on thinnest edge 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price.

Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3/16 in. take the price of 3/16-in. plates, and all extras for width of 3/16-in. plates, as well as gage.

Plates over 72 in. wide ordered to the weight of 3/16-in. plate shall take price of No. 8 B.W.G.

Plates over 72 in. wide, ordered to the weight of No. 8 gage, shall take the price of No. 9 B.W.G.

Allowable overweight, whether plates are ordered to gage or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Gages

Gages lighter than ¼ in. to and including 3/46 in. on thin edge up to 72 in. wide, inclusive	10 per cent of base price
Gages lighter than 3/16 in. to and including No. 7 and No. 8	15 per cent of base price
Gages lighter than No. 8 to and including No. 9 and No. 10	20 per cent of base price
Gages lighter than No. 10 to and including No. 11 and No. 12	25 per cent of base price

Widths

(Applies to plates ¼ in. thick and heavier)

	Per Lb. Extra
Widths over 100 in. to 110 in., inclusive	0.05c.
Widths over 110 in. to 115 in., inclusive	0.10c.
Widths over 115 in. to 120 in., inclusive	0.15c.
Widths over 120 in. to 125 in., inclusive	0.25c.
Widths over 125 in. to 130 in., inclusive	0.50c.
Widths over 130 in. to 135 in., inclusive	1.00c.
Widths over 135 in. to 140 in., inclusive	1.25c.
Widths over 140 in. to 145 in., inclusive	1.50c.

Special Extras for Wide Light Plates

(Gage on thin edge, 3/16 in., No. 7 and No. 8)

Over 72 to 84 In., Incl.	Over 84 to 96 In., Incl.	Over 96 to 100 In., Incl.	Over 100 In. Wide
10c.	20c.	30c.	35c.

Grades

	Extra per Lb.
Tank	Base
Hull to Lloyds or equivalent	0.10c.
*Pressing (not flange for boilers)	0.10c.
†Flange or boiler	0.15c.
A. B. M. A. and ordinary firebox	0.20c.
Still bottom	0.30c.
Locomotive firebox	0.50c.
Marine	1.50c.
Material subject to Navy Department specifications or inspection	0.10c.
High tensile hull steel to U. S. Navy Department or equivalent specifications	1.00c.
Navy Department boiler steel—Classes "A" and "B"	1.50c.
Hull plates to hull specifications required to stand cold flanging take extras for Flange Steel.	

*Plates will be stamped "Pressing."
†Plates will be stamped "Flange."

Cutting

	Extra per Lb.
Lengths 3 ft. and over	No extra
Lengths under 3 ft. to 2 ft., inclusive	0.25c.
Lengths under 2 ft. to 1 ft., inclusive	0.50c.
Lengths under 1 ft.	1.55c.

Regular Sketches

With not more than four straight cuts, including straight taper plates	0.10c.

Irregular Sketches

With more than four straight cuts	0.20c.

Sketches cannot be sheared with re-entrant angles.

All sketch plates (other than those sheared to a radius) will be invoiced at actual weight of the sketch, at the base price, plus standard card extras (including sketch extras mentioned), with an additional charge for waste, if any, to be determined by deducting the actual weight of each sketch from the estimated table weight of the smallest rectangular plate from which the said sketch can be secured, the difference to be invoiced at the rectangular plate price, less an allowance for the value as scrap, which allowance shall be 40 per cent of the base price of rectangular plate.*

Note: The "rectangular plate price" at which the difference is to be invoiced is held to be the net price, f.o.b. mill, which the maker would have realized had the rectangle been shipped to the same destination as the sketch cut from it. Such price is properly figured by adding to the Pittsburgh base price the full extras for size, gage, quality and cutting to length, and the carload freight rate from Pittsburgh to destination; and then deducting the carload freight rate from maker's mill to destination.

*The 40 per cent referred to is the average ratio between No. 1 heavy melting steel scrap and finished plate prices in the United States over a period of 15 years.

Sketches sheared to a radius take circle extras.

Circles

Diameters 3 ft. and over, 25 per cent of base price.
Half circles take circle extras.

Special

For cold sawing such items that cannot be sheared (such as stem bars), 0.25c. per lb. extra.

Sketches or circles over 100 in. in width or diameter take width extras in addition to sketch or circle extras.

All sketches, regular, irregular, circular, semi-circular or special, with greatest dimension under 3 ft., take extras for cutting to length in addition to sketch or circle extra.

Inspection

Charges for other than mill inspection, such as Lloyds or "American Bureau of Shipping" for buyers' account.

Pittsburgh Foundrymen's Association

The Christmas holiday meeting of the Pittsburgh Foundrymen's Association was a social affair, as has been the custom of this organization for some years. The Christmas meeting was held in the rooms of the Pittsburgh Athletic Association in that city, the principal speaker being A. O. Backert, president of the American Foundrymen's Association. In his address Mr. Backert gave a detailed account of the preparations that were being made by foundries all over the country, notably in the Pittsburgh district, to engage in the manufacture of semi-steel castings, but which were stopped when the war ended. Mr. Backert also referred to the expectations of foundrymen that prices of pig iron would drop very considerably, and warned them against being too sanguine of this. He said that present costs of making pig iron are abnormally high and almost equal in selling prices, so that for this reason any considerable drop in prices of pig iron could not reasonably be expected.

The meeting was in charge of an entertainment committee consisting of J. S. McCormick of the J. S. McCormick Co., chairman; W. W. Sanderson, the Carborundum Co.; C. W. Howat, the Union Steel Casting Co., and T. E. Malone, the J. S. McCormick Co.

The Republic Iron & Steel Co. has blown out No. 2 Haselton blast furnace at Youngstown, Ohio, for repairs and relining. It will also be converted from a hand-filled to a mechanical-filled stack, skip hoist being added. Capacity will be increased 25 tons daily, from 425 to 450 tons. A new boiler house is being built at the blast furnace plant. Nos. 1, 3 and 4 furnaces were overhauled during the year, as well as Hall furnace at Sharon and Hannah stack in Youngstown.

Machine Tool Industry Faces a Crisis

War Expansion Creates $300,000,000 Surplus of Government Munition Machinery—Annual Output of Machine Tools Approaches $500,000,000

AS its share in the unexampled war effort of the United States the machine tool industry for the first 10 months of the past year was engaged to every last mold and machine in an endless struggle to overtake the pyramiding requirements of the Army and Navy and the Allies. Under so strong a stimulus its capacity for production when the armistice with Germany was signed is conservatively estimated in the neighborhood of $400,000,000 worth a year, equivalent at pre-war costs to $250,000,000 or $200,000,000 on a straight time-labor basis. Of the so-called standard lines the annual output is placed at $50,000,000 in 1914 or about $100,000,000 to-day. But for the sudden collapse of the Central Powers this phenomenal growth would have gone on to a substantially greater total.

War Ends Expansion

Many great war projects were abandoned upon Germany's virtual capitulation. Work was stopped on the construction of the $60,000,000 gun and projectile plant which had been started at Neville Island, Pittsburgh, by the Ordnance Department, United States Steel Corporation, and for which equipment orders exceeding $10,000,000 had been placed; on the production of 33,000,000 semi-steel shells; on the creation of a gun relining plant in France, to have been one of the largest in the world and cost over $25,000,000, half of this for machine tools; recent contracts for $130,000,000 worth of motor trucks and vehicles for the Army. In the Detroit district alone war work amounted to about $1,200,000,000. The Navy's requirements for the most part, were, however, unaffected.

So fast was the outlay for war and so stupendous had become the ordnance program of the American army leaders that the First General Deficiency Appropriation bill, approved by Congress about a month before hostilities ended carried over $6,000,000,000 and provided $3,699,256,642 for the Ordnance Department, $250,000,000 for the Chemical Warfare Division, $60,000,000 for military aeronautics, $95,000,000 for the Signal Corps, and $326,250,000 for the Engineer Corps.

For some time past private capital had been unable to finance the unparalleled expansion of manufacturing, and war plants were equipped with tools bought by Government funds and remaining the property of the Government. When the demobilization of war work, following widespread cancellations, was set in motion last month at Washington, about $300,000,000 of Government-owned machine tools were turned over to the Committee on Salvage of the War Department to be placed on the market again. Of this total approximately $200,000,000 worth are standard machine tools, practically all in new or prime condition, and amount to the output of the country for from one to two years at the normal operation of existing machine-tool building facilities.

War Department Policy Toward the Machine Tool Industry

WASHINGTON, Dec. 31—Assistant Secretary of War Crowell states that the Government does not intend to compete with industries in the disposition of material on hand. Among other items it has $300,000,000 worth of machine tools. Mr. Crowell declared that to dispose of this it would ask the industry to handle these with its own output on a basis of 20 per cent of each company's sales. He was confident that the result would be to prevent the demobilization of the machine tool industry.

It is also possible that the Government's enormous surplus of machine tools may be used to help directly in the rehabilitation of the industries of Belgium and northern France. This is one of the problems which Chairman Baruch of the War Industries Board and Director Replogle of the Steel Division will investigate upon their arrival in Europe.

At the intercession of the War Industries Board, also, the War Department is to hold back from the market its supplies of raw material wherever there is a danger that Government sales would have a bearish effect upon prices. First of all, this is to be done in the copper industry.

Plan to Control Surplus

The present vital concern of all the metal-working industry and of labor and political leaders is the successful working out of the suggestion, which met with the almost unanimous approval of the members of the National Machine Tool Builders' Association, the National Supply and Machinery Dealers' Association and the representatives of the War Department, whereby machine tool builders will dispose of one Government machine for each identical one sold from current manufacturing stock. This would control the resale of the Government surplus over a period approximating four years, unless other outlets should develop for it. The report to come from the joint committee handling the working out of this program unquestionably holds the immediate future welfare of the machine tool industry in its hands.

The acceleration of the American war machine continually set greater and greater requirements for machine tool builders to accomplish. Early in January the Ordnance Department of the Army issued what was up to that time probably the greatest single inquiry known for machine tools. The list comprising 500 planers, several hundred engine lathes, over 100 horizontal boring, milling and drilling machines, and other tools for delivery within two months' time. Although the trade for the moment was comparatively quiet, many projects were pending, and the Central West was undergoing a great expansion in munitions manufacture. It was clearly evident that heavier burdens would be placed on machine-tool builders, but nevertheless they were not exempted by the Fuel Ad-

ministration from the five-day industrial shut-down, Jan 18 to 22, and it was some time before these plants were excluded from closing down over Mondays.

Early in February the Machine Tool Section of the War Industries Board found it necessary to take drastic steps to secure tools for important war work. The builders were asked to furnish lists of their customers for the past 20 years. Armed with this data the authorities at Washington commandeered from them such tools as they wanted most. Lists of tools held in storage were also required from dealers in second-hand equipment by both Army and Navy officials.

War production speeded up in every direction, and sub-contracts from Government and from direct private contractors spread over the entire country, being especially numerous throughout New England.

Out of the early chaos of priorities, refinements in regulation were soon evolved. Tool builders by early March were supplied by the Machine Tool Section each month with blanks, which they were required to fill out, giving the number of new priority orders they had received together with such shipments made against them. Deliveries on priority order were in a short time showing a marked improvement except for large tools, on which the makers were less and less able to meet demand as the year went on. The inevitable weak link in production proved at this time to be a shortage of shell-forging facilities, which were reported to be far short of the country's machining capacity.

Huge Ordnance Provisions for 1919

Before the first quarter was ended reports were current of an enlarged ordnance program for 1919 calling for hundreds of millions of dollars worth of guns and munitions. About this time the War Department asked Congress for $400,000,000 general deficiency appropriation for heavy artillery, part for expanding existing gun plants in eastern Pennsylvania.

By April shell makers were receiving orders from Washington to double their output. Coincident with the German spring offensives, culminating in the drive for Paris, the whole national war effort was redoubled, total new shell orders being estimated at $50,000,000. In response to the incessant demands of General Pershing the output of Liberty motors and motor trucks was also accelerated.

Government machine-tool requirements for the next three months were placed at $80,000,000 by May, largely for ordnance work; but the inability of boring and turning lathe makers to keep up with deliveries retarded War Department programs. On large tools deliveries were nearly 12 months behind. The entire shell-making capacity of the country was absorbed, and in addition the War Department awarded contracts to Canadian munition plants.

Announcement of the great $60,000,000 gun and projectile plant to be erected on Neville Island, Pittsburgh, by the new Ordnance Department, United States Steel Corporation, was made early in May, and initial figures by Army officers placed the machine tool needs for this plant and the proposed 16-in. howitzer plant of the Midvale Steel & Ordnance Co., at Nicetown, Philadelphia, at $15,000,000 of which only $1,500,000 worth could then be promised for delivery in 1918. Ordnance Department representatives stated that a $10,000,000 shortage existed in tools vitally needed to maintain war programs. Practically every branch of manufacturing was speeded up another notch, including the manufacture of machine guns, tractors, fabricated ship parts, marine engines and boilers.

Shipyard Expansion

The Emergency Fleet Corporation projected two great troopship yards, finally concentrating on that at Alameda, Cal. Under the management of the Bethlehem Shipbuilding Corporation a 10-way yard was planned with equipment of over 100 punches, shears and other fabricating tools and 200 electric overhead cranes. Wide publicity was given the campaign to enlist shipyard workers. Unheard-of wages were offered, and metal-working plants had great difficulty in retaining such of its vigorous skilled workmen as had not been drafted into the army. Many unskilled workers were hastily trained as machine tenders. Shop discipline became noticeably slacker, labor turnover more serious a problem, and the individual output fell off.

Some idea of the equipment needed for the great war projects was given by inquiries that appeared early in July for 400 machine tools and 179 cranes for Neville Island at a cost of over $2,000,000; for 120 machine tools and 27 electric overhead cranes for the 16-in. howitzer plant of the Midvale Steel & Ordnance Co. The United States Steel Corporation issued a list for making daily 1500 shells of 12, 14 and 16-in. caliber. The Symington-Chicago Corporation undertook the establishment at Chicago of a plant to cost complete $6,500,000 and turn out 10,000 shells a day.

Under the ceaseless demands for production, builders of electric overhead cranes fell further behind in their work, and toward midsummer their output was placed under priority. They were by then sold up generally for at least a year ahead.

In an effort to keep pace with the demand for locomotives for France a plan was inaugurated for the construction of a great locomotive building plant at Chicago by the Baldwin Locomotive Works, Philadelphia, for which 1049 tools were to be purchased. The tentative character of this project, however, persisted; but large railroad shops were begun at Glenwood, near Pittsburgh, by the Baltimore & Ohio Railroad and at Marietta, Pa., by the Pennsylvania Railroad. The latter was a steady purchaser of machine tools throughout the balance of the year, and there was some substantial buying in the case of several others, but as a whole the railroads stayed out of the market except for occasional small needs.

In the year ended with May the Ordnance Department of the Army had contracted for $4,000,000,000 of munitions as compared with $14,000,000 a year before that. Of 75-mm. shrapnel shells, for example, 125,000 rounds were completed in January, 900,000 in April, the rate for the balance of the year; of 75-mm. high-explosive shells, 248,000 were turned out in April, 1,000,000 were expected in July and 2,000,000 in September.

Barred Industrial Zone Shifts Buying to Mid-West

By June the metal-working plants along the northern Atlantic Seaboard were becoming congested. Machine tool buying in New York, Philadelphia and other large coast cities was at a feverish pitch, but the establishment of a barred zone to stop further industrial congestion in New England, eastern New York and near by, caused a quick development in munition manufacture throughout the Central West, and shifted demand quickly to that section.

The Emergency Fleet Corporation in its effort to supply marine equipment for the fabricated ships which by now were beginning to be launched, set under way the establishment of marine boiler plants by the Barber Asphalt Paving Co. at Buffalo, N. Y., and Maurer, N. J.; by the Sun Shipbuilding Co., at Chester, Pa.; and the Newport News Ship Building & Dry Dock Co., at Richmond, Va.

Closer Government Supervision

The shortage of fabricating machinery for structural yards and shipyards had become so serious by midsummer that a conference of builders of such equipment was held in July at Washington and plans laid for increasing the output. A committee was appointed to co-operate with the Machine Tool Section of the War Industries Board, and to enlist suitable non-essential plants to increase production.

Throughout the trade Government control grew daily firmer and more searching. The increasing shortage of machine tools, as the third quarter of the year approached, was the subject of further conferences at Washington, and plans were formulated for hurrying production by the elimination of less needed types and sizes. The Government's locomotive crane requirements for the year ahead were pooled and orders for 600 were allocated by the Crane Section of the War Industries Board.

Purchasing went on constantly in connection with the pushing of airplane motor manufacture. Large

sub-contracts were let by the Wright-Martin Aircraft Corporation to the H. H. Franklin Mfg. Co., Syracuse, N. Y., and the Pierce-Arrow Motor Car Co., Buffalo, N. Y., for work on Hispano-Suiza motors and parts. The Willys-Morrow Co., Syracuse, and other Willys interests also took on airplane motor work.

Plans were completed about this time for the great $30,000,000 gun-relining plant in France for the American Expeditionary Forces. Heavy purchasing continued. The Winchester Repeating Arms Co., New Haven, Conn.; Landers, Frary & Clark, Inc., New Britain, Conn., and the National Cash Register Co., Dayton, Ohio, bought hundreds of thousands of dollars worth of machinery for enlarging the production of pistols, and steps were taken to let several other large pistol contracts. The War Department now asked Congress for nearly $7,000,000,000 emergency funds to carry out its munition contracts.

Approximately $130,000,000 additional motor trucks and vehicles were awarded automobile makers early in October for the Motor Transport Corps, and automobile manufacture went on to practically 100 per cent war work.

Conflicting reports began to circulate about the middle of October with the announcement of the temporary curtailment of the Alameda shipyard and the Government project of the New York Shipbuilding Co., at Camden, shortly followed by the statement by the Shipping Board that contracts for troopships to be built at these yards were canceled. Influenza spread through the country and for a while threatened production. To maintain output the Ordnance Department appealed for added effort by workers not afflicted. Congress voted the billions asked for. The Government also completed the purchase of several million dollars worth of 500-ton to 2500-ton hydraulic presses for forging hot ingots for shells. The Ordnance Department, United States Steel Corporation, had by that time placed orders for about $10,000,000 worth of machine tools for the Neville Island plant. The entire capacity of the country was brought together to work out ways and means for the production of 33,000,000 semi-steel shells. As metal-working industries swung into this new high level of manufacturing, the enemy yielded and war demand was promptly ended.

Collapse of Teutons Checks War Work Abruptly

With the passing of Austria-Hungary and Turkey to a non-belligerent status, war plans began to be altered accordingly. The specifications for the Neville Island gun plant were revised, involving the cancellation of a considerable amount of machine tools. The proposed 12-in. howitzer plant of the Midvale Steel & Ordnance Co. was abandoned. The Government, however, urged no letup in the production of machinery. This attitude was borne out by the placing of contracts in the Chicago district for about 22,000 adapters for shells daily.

The Administration Unprepared for Peace

Immediately after the break in the ranks of the Central Powers buying was slightly curtailed, and cancellations began to pour in. Upon the signing of the armistice it became evident that there must be a readjustment of the metal-working industries. Washington dispatches indicated that this was to be effected through the agency of the War Industries Board, and that while the Government would not undertake to accept any overload of war supplies, it would avoid wholesale or wanton cancellation of contracts.

It soon became evident that the Administration had made no plans for rapid readjustment to either a reduced war or a peace basis. As several weeks went by with nothing but reassuring statements of a general character from Washington in the press, machine tool builders and dealers became fearful as to the immediate future of their business. All war work contracts were being stopped or cut down. By the first week in December the stream of cancellations tapered off rapidly. Machine tool sales following the end of hostilities fell off to almost nothing. Buyers predicted a sharp break in prices, which averaged 20 to 30 per cent over a year ago; but the builders and dealers showed no inclination to reduce quotations. The predicted flood of second-hand tools failed to materialize.

Developing the Scheme of Readjustment

The scheme of war contract adjustment, as made public Dec. 1 by Assistant Secretary of War Crowell, placed the work under the jurisdiction of District Adjustment Boards in various centers of production; but the entire machinery of adjustment was blocked at once by the ruling of the Comptroller of the Treasury Department that supplementary contracts for the payment of an arbitrary sum of money in adjustment of cancellation, might be declared illegal and require legislation to clear up the situation.

The efforts of machine tool builders, with the support of the dealers' associations, were then directed to the working out of a program for the resale of the immense reservoir of Government-owned tools, and the joint committee was appointed which is now in session with War Department officials. The new year therefore finds machinery industries in the midst of readjustment and faced by the necessity of finding new markets for their expanded output.

Forecasts of the Machinery and Associated Trades

A survey of numerous representative machinery manufacturers, made by THE IRON AGE, shows that on an average from 85 to 100 per cent of product was for direct war work or for the equipment of war contractors. The enlargement of plants making such equipment was up to several times pre-war capacity in various instances, and working forces showed similar increases, for the most part from 60 to 100 per cent. Output per man was appreciably below pre-war standards, and prior to the armistice shop discipline had fallen low. It has shown a marked improvement, however, since Nov. 11.

Manufacturers are a unit in the view that labor troubles are highly improbable even in communities where labor agitators have been active. Few business men appear willing to hazard a guess as to how long it will take to return to a peace basis, or as to what the demand in their line will be for the next six months. The disposal of the $200,000,000 Government surplus of standard machine tools will have such a powerful effect on the production and sale of machine tools, that the reluctance of machine tool builders to predict the future is manifest; but makers of many other lines of machinery and metal specialties, certain special machinery, etc., take varying but generally optimistic views of the immediate future. Those plants making radical changes in the character of their product expect to consume anywhere up to 12 months in the readjustment of shops and manufacturing.

Demand Good in Many Machinery Lines

Birmingham Iron Foundry, Derby, Conn.—Chilled and Sand Rolls, General Heavy Machinery, etc.—The demand for our product is good and we think it will be for some time to come. We have considerable export business on our books, and in our line the most promising markets are Japan, Mexico and South America.

Heald Machine Co., Worcester, Mass.—Grinders, Magnetic Chucks—Our deliveries now run about 3 to 4 weeks. Orders coming in better than expected. Believe business will be first rate within six months.

V & O Press Co., Glendale, Long Island, N. Y.—Presses, Dies and Special Machinery—We expect a continued heavy demand for our product. This is due to the fact that presses are utilized in widely diversified lines of manufacture, many of which lines have been tied up because of war conditions, and find it necessary to improve or add to their equipment, and further-

more, we find many who now desire to take up new propositions which they have unavoidably held in abeyance for many months.

D. H. Stoll Co., Buffalo, N. Y.—Presses, Shears, Dies, and Special Sheet-Metal Machinery.—We are very optimistic as to the prospects for the future and our basis for this opinion is formed on the mere fact that inquiries at the present time are particularly heavy and it is our expectation that our line of business will be on a normal basis, at least, by Feb. 1, 1919.

Dunning & Boschert Press Co., Syracuse, N. Y.—As to probable demand for our products during the first half of 1919, would say that we already have orders on our books that will carry us beyond that period and do not anticipate any cancellations. We believe the outlook for export trade is excellent.

J. A. Fay & Egan Co., Cincinnati, Ohio—Woodworking Machinery—The demand for our products from all indications looks good, particularly the export part of the business, and the most promising market for our machinery is the whole world.

Luster-Jordan Co., Norristown, Pa.—Wood Box Machinery, Etc.—The demand for our product seems to us to be very good for the coming six months. We have quite a number of inquiries and quite a few prospects which are pending.

Cox & Sons Co., Bridgeton, N. J.—Pipe-Cutting and Threading Machinery—Our civilian business has materially increased since the armistice was signed. We are more than pleased with the outlook for the first six months of 1919. We anticipate a large export trade, in fact various correspondents are now on their way to this country for the purpose of placing business with us. Our export business has been handled direct from us to the consumer. It has been more than satisfactory. Settlements have been gratifying; in fact, all that could be desired. We have in the past conducted an export business in all parts of the world. For the immediate future, however, we regard the countries represented by the Allies as the most promising.

Weimer Machine Works Co., Lebanon, Pa.—Coke Barrows—The demand for our products and the work we have on hand will keep our works busy all of 1919.

Minneapolis Steel & Machinery Co., Minneapolis—Has been giving serious consideration to the future, and has several plans which have been brought almost to maturity. The company intends to cultivate foreign trade, but is fully determined not to do this at the expense of the domestic market. It considers the Northwest, for which it is so advantageously located, of supreme importance. The company manufactures Twin City Motors, the production of which it hopes to develop on an extensive scale. It has added a fifth size to its tractor fleet in the form of a machine rated at "12-20," and inasmuch as this is a production proposition, the company officials feel that it will utilize a large part of the plant and its employees. The production of other lines probably will be extended, and new lines are contemplated.

Stewart Mfg. Co., 4535 West Fullerton Avenue, Chicago—Die Castings—Expects a normal market for its products, in other words, it expects to utilize 100 per cent of its capacity on an 8-hr.-day basis in about six months by going back to former lines and adding new ones.

Reading Chain & Block Corporation, Reading, Pa.—We are looking forward to a very extensive export business, which is in evidence from the many inquiries we have had and many of which have resulted in orders. Taking it in all, we are very optimistic of the future business conditions.

Gifford-Wood Co., Hudson, N. Y.—Elevating and Conveying Machinery, Etc.—We are looking for a large demand during 1919. Referring to export trade, we have had an unusually large number of inquiries for the present season, from France especially. England, Norway and Russia at this date have not given us as many inquiries as usual.

Hale & Kilburn Corporation, Philadelphia—Railway Car Seats, Steel Car Trim, Etc.—We expect a small demand Jan. 1, 1919, for our products, but a very heavy demand in less than six months from that time. We are planning for a larger export trade than we have handled at any time in the past, but have not settled upon any definite plan as yet. We expect our foreign markets to be England, France and South America. Our railroad products should be in good demand in these countries.

Business in Some Industries Marking Time

Reed-Prentice Co., Worcester, Mass.—Lathes and Drilling Machines—Market prospects: This is a problem that we have not been able to solve. We believe, however, that as soon as Belgium and France are in position to purchase and transport machine tools that there will be a very large market in these two countries. Our markets in the United States will not amount to much until business in general is a whole lot better than it is to-day.

Sizer Forge Co., Buffalo, N. Y.—Ship Shafting, Engine Forgings, etc.—Our business is peculiarly a local business because we make nothing for stock and every piece is made to a customer's blue print. Except in rare instances and in ordnance there has been little export of American forgings except to Canada and the West Indies. We do not care to hazard a guess, for that is all it would be, on the commercial business outlook for next year but we are trying to feel as optimistic as possible.

Lumen Bearing Co., Buffalo—Brass Founder—The demand for our product will probably be below normal for the first six months of 1919. Sometime during the summer of next year, or at least by early fall, we expect the demand to increase, and believe that the demand for our material will be heavy for at least five years. We have been doing a little export business in machine bronze; a material which we sell through jobbers and carry in stock in Buffalo. The method of exporting would undoubtedly be through export houses. In some cases, however, we are dealing through foreign output houses, who have come here asking for our product.

Hilliard Clutch & Machinery Co., Elmira, N. Y.—Clutches—It may require a few months' time for conditions to become stable but we look for a satisfactory demand for our product during the coming year. We are using more publicity than ever before and have for some months, with a view to increasing our distribution against the day when the war basis would cease.

New Process Gear Corporation, Syracuse, N. Y.—Cut Gears, Rawhide Pinions, etc.—We do not anticipate that the demand for our product in the coming six months will be anything in excess of our maximum production. We have never exported any of our product and at this writing there has been no change in the policy in this respect.

Edge Moor Iron Co., Edge Moor, Del.—Water-Tube Boilers—Demand was immediately lessened upon signing of armistice. Do not look for active resumption of orders during first half of 1919.

C. C. Bradley & Son, Inc., Syracuse, N. Y.—Cushioned Power Hammers and Forges—We do not figure that the demand for hammers will be quite as great the first six months in 1919 as the last six months of 1918. We had about one-third of our war orders cancelled after Nov. 11, but 25 per cent of these have since been reinstated. The outlook for export trade seems bright. At present we have orders for export to England and France, but are having some trouble in getting permission to make shipment. We have old established agents in Great Britain, and an agency that covers practically all of Europe in peace times. This latter agency

has its main office in Paris. Our agency covering Germany, Russia and Austria disappeared when the war started, and we haven't heard of it since. We do not expect much from these countries for at least a year, and possibly longer. It is very hard to forecast the future but it seems to us that the machinery business will gradually return to normal. Everyone seems to be "playing a waiting game" at present.

A Lathe and Planer Manufacturer—The probable demand for lathes and planers during the first six months of 1919 will be very small, and we are laying our plans accordingly. As regards export trade, we look for a large business within a year's time from all of Europe and also from Asiatic countries.

Eastern Machinery Co., New Haven, Conn.—Elevators—Our regular line of business will improve slowly. Do not expect immediate return to the amount of business doing in 1915. By spring a great deal of improvement is expected.

Craig Ridgway & Son Co., Coatesville, Pa.—Elevators, Air Hoists, Steam Hydraulic Machinery—Judging from the letters that are coming into our office, we look for a good business in 1919. We manufacture an article for new factories and inquiries for prices show that there is going to be something doing. Our follow-up letters bring replies that lead us to know that a great many people are just simply waiting to see how the "old cat is going to jump."

Abrasive Co., Philadelphia, Pa.—Grinding Wheels—There is a falling off in demand for our goods, the same as in most manufacturing lines, but we have plenty of orders which will be executed, and we expect the demand to improve steadily after Jan. 1. We do not look for any depression in our factory—on the contrary, expect an ever-increasing demand. We have a large export trade and expect present demands in allied countries to be maintained. We expect a large increase in demands from neutral countries. Although there has been some falling off in demand as the result of the armistice, followed by some cancellations, resulting in some uncertainty on the part of purchasers and the approach of the inventory period, we expect a quick recovery and an even greater and increasing demand during the new year, both domestic and foreign.

Carborundum Co., Niagara Falls, N. Y.—Abrasive Materials—We look for a less than normal demand for our products.

Automobile Makers' Demands

R. K. LeBlond Machine Tool Co., Cincinnati—We are unable to offer any opinion in regard to the demand for our products for the first six months of the coming year. The two lines of business from which we think our greatest number of orders should come is the automobile field and the railroad shops. It depends largely upon the policy the Government takes in dismantling Government owned and controlled shops, many of them converted automobile shops. In regard to the placing of the equipment now in these shops on the market in competition with our future products: This is a phase to be considered as well from the possibility of export business as there is a great probability of these machines, now in the hands of private individuals but owned by the Government, being placed on the open market. We are now laying plans for a vigorous sales campaign in this country. We do not believe that Europe is ready for it.

J. N. Lapointe Co., New London—Broaching Machines and Broaches—We anticipate a very large demand for our product during the six months following Jan. 1 next, especially from the automobile and tractor industries. We feel that the export business, especially in England, France, Italy and Japan will be very good.

A Manufacturer of Gear Shapers—The demand for our product has not slackened up in the least, due to the cessation of hostilities. In fact, everything tends to indicate that our business in 1919 will be the greatest we have ever had in our history.

Rivett Lathe & Grinder Co., Boston—Precision Tools—If we were able to estimate the probable demand for our products for the next six months, our problem would be greatly simplified. The demand for our products depends largely upon the general trend of business; in other words, if automobile manufacturers, for instance, approach closely 100 per cent production, the demand for our products will approach more nearly 100 per cent. Regarding the export market, we are unable to make any accurate comments, and we doubt if anyone is in position to state with any degree of accuracy just what may be expected, until international problems regarding shipping, finances, general policy, etc., are settled. The cost of labor is going to have a marked effect on the volume of export business of this country. We believe that as formerly the bulk of the machine tool builders business will come from home trade, and that export business will not take up to any great extent the slack in domestic trade; in other words, the export business will, no doubt, be of sufficient volume to make it worth while, yet it will not be of such volume that the manufacturer can depend upon it only to an extent slightly greater than previous to the war.

Taft-Peirce Mfg. Co., Woonsocket, R. I.—Light Machinery, Special Machining Tools.—We are inclined to think that business will be slow for several months to come. As to export business, may say that the smoke of battle has not sufficiently cleared to enable us to hazard a guess as to what can be expected. Owing to present exceedingly high ocean freight rates, scarcity of tonnage and the fact that machine shop capacity in England and France has been enormously increased since 1914, present indications are that export business in our line will be of very meagre proportions until the European situation is cleared.

Banking and Shipping the Keys to Exporting

Tropenas Converter Co., Brooklyn, N. Y.—Demand for our products in the United States will be small, unless the waiting period for lower prices extends to unusual lengths, in which case the foundries operating either large steel-making units or slow (and therefore not flexible) small units will have to resort to the quick, flexible all-around converter process. The outlook for export is excellent, inasmuch as we supply equipment of which little is yet in use in Latin America, and of which much was destroyed in Europe. The Tropenas connections in Europe have lost two steel foundries in Belgium and three in France. These must be rebuilt entirely from American sources. Most steel foundries using the converter process in France and Belgium have been destroyed. The most important question to be settled in connection with export trade is that of payments. In France most of the northeastern and eastern establishments have been in the habit of charging off large portions of their plants every year. Some of these industries have very valuable plants, which on their books stand at the nominal value of one franc. These prospective customers have, therefore, considerable cash and credit balances. There are naturally other plants which were hard hit by the war, and which will not be able to pay promptly for their purchases. Help must, therefore, be extended until indemnities can be collected, and when one realizes that some of the claims arising from the 1870 war are yet to be settled, this help will take the shape of long, very long term credits. How will our banks look upon such accounts receivable as basis for domestic credit? Barring few exceptions, American banks are not in a position to finance American export trade. They lack the information-getting machinery, which they are used to in this country, and inasmuch as they are forbidden to take chances, their conservatism is most of the time excessive. You can obtain a balance sheet from nine out of ten reputable firms in this country. Abroad you cannot secure these data once out of a hundred. And still, personally, we would rather sell to a French

or Brazilian house on their 90 or 120-day acceptance than we would on 30-day open account to most American houses. Frankly, the greatest joke in America is the selling to domestic firms on a 30-day net basis, knowing full well that your collections will average from 60 to 100 days, and then turning around and selling full cash against documents to a foreigner who is perhaps the biggest customer on your books. The war has taught the Latin world that saving does not mean skimping, and that working 12 hr. a day does not mean producing more than by only working 8 hr. with modern machinery. The Latins of Europe have learned to spend. To spend more they will have to earn more, especially that labor competition will have been greatly decreased through casualties. By earning more they will come up to our wage level and will give us a better chance to compete with them in other parts of the world. We firmly believe, however, that our chances of selling manufactured products in Europe will be very slim in three or four years from now, because we will by then have supplied them with the machinery to best compete with us.

Buffalo Forge Co., Buffalo, N. Y.—Blowers, Drills, Forges, Sheet-Metal Machinery—The long-delayed public building work will furnish a considerable demand for our products, and this with the construction and equipment of the less essential classes of industry, which has been unavoidably held up, should produce a normal domestic demand for our products. The prospects for export trade depend, as far as we are concerned, on the assistance offered by the Government, and on shipping. If the Government fosters the association of manufacturers for export shipping, assists them in obtaining essential information, and by the amendment of the present shipping laws makes it possible to operate American ships in foreign trade profitably under peace conditions, there will be plenty of business not only in devastated Europe, but in the South American countries, which should be our peculiar field. In these South American countries American banking interests can be a very important factor in increasing our foreign trade, but we note with regret the tendency of the bankers to organize their own export companies and foster them to the disadvantage of other channels. This is distinctly to the disadvantage of American manufacturers.

A Manufacturer of Wrought Steel Belt Pulleys—It is very difficult for us to say to what extent there will be a demand for this product on Jan. 1, 1919. Judging from orders to-day, however, we are led to believe that dealers are not buying freely. Unquestionably the uncertainty in regard to the situation concerning steel prices has everybody more or less upset at the moment. Naturally also dealers are disposed to cut down during December prior to inventory and closing of books. We expect to see a better demand for pulleys after Jan. 1, gradually increasing from that time, but we do not look for any remarkable business for some three or four months to come. We expect, however, an increasing export business, which may require more liberal terms than heretofore, but we do not look for anything startling in the immediate future.

Snead & Co. Iron Works, Jersey City, N. J.—Machinists and Founders—Probable demand for our products in the United States, Jan. 1, 1919, almost nil; six months from then probably moderate. We expect an increased export demand, but will need American shipping and American banking facilities throughout the world to handle same successfully.

Southworth Machine Co., Portland, Me.—Machinery and Labor Saving Specialties—We expect our punching machine market within the United States to be at least normal for the next six months and it may show an increase. We believe there is ultimately a very considerable foreign market that could be developed for this line of trade. We are very much in doubt as to the outlook, either domestic or foreign, for our line of turret screw machines. A letter would be too brief in which to discuss methods for handling foreign business, except to say, that in the writer's opinion unless it is handled in the future in a more consistent, persistent, co-operative and intelligent manner, both as regards selling and financing, the rest of the world will lick us to a "frazzle."

Throwing Off German Domination

Fafnir Bearing Co., New Britain, Conn—Ball Bearings—We look for greatly increased demand for ball bearings in all fields as soon as the temporary hesitation following the termination of the war is over. The policy of the Government in specifying ball bearings so generally in the equipment for the army and aircraft service, regardless of price considerations, has created wider knowledge throughout the nation of the many advantages in ball-bearing applications, and has demonstrated the value of ball bearings to many manufacturers who did not previously use them in their own products. In addition to this, the substitution of American-made bearings for those formerly imported, largely from Germany, has demonstrated the advantages of an American-made product, both in the quality of workmanship and in more intimate service relations. So far as this industry is concerned, we do not look for greatly increased direct exportation of our product. The United States was, before the war, the finest market for ball bearings that Germany had. We do, however, look for the greatly increased sale of bearings for equipment, in automobiles, tractors, trucks, machine tools, etc., for the export trade.

Morris Machine Works, Baldwinsville, N. Y.—Centrifugal Pumps, Steam Engines and Circulating Pumps for Surface Condensers—At the present time we have unfilled orders which will keep our plant on full time for at least six months. By that time we expect that our regular channels of work, such as hydraulic dredges, pumps for municipal plants, mines, etc., will be opened so that no immediate depression in our lines is expected. For many years we have enjoyed export relations principally with the gold mines of South Africa, where we have had representatives for the past 25 years. Unfortunately this connection was controlled by the Krupp interests so that on the declaration of war we abandoned our South African office and have been in correspondence with a prominent English concern who we expect will represent our company when conditions readjust themselves. Eventually we shall link up with prominent houses in the various strategic centers of the world handling our class of machinery. Due to the engineering data necessary for intelligently filling a customer's pumping requirements it is necessary that our representatives be engineering concerns. Due to the fact that the European builders manufacture high-grade centrifugal pumping machinery, our principal market will be in those countries which are not manufacturing centers, such as Australasia, South Africa, India, China and the North African colonies.

Cincinnati Electrical Tool Co., Cincinnati—Portable Electrical Drills and Grinders—We think there will be a demand for our products in this country, but that business conditions will not be normal for some time. We think the export trade will open a wide market for us, as Germany has heretofore been our principal foreign competitor in the export field.

Massey Machine Co., Watertown, N. Y.—Governors—Present demand same as for last six months. Germany controlled European trade on our governor before war.

Important Bearing of Peace Arrangements

Norton Grinding Co., Worcester, Mass.—Machines for Cylindrical Grinding—At the present time there is, of course, very little demand for any class of machine tools. We are, however, securing small orders from time to time and the inquiries are improving very rapidly over the situation as it existed during November. We are inclined to believe that by six months there will be a very satisfactory volume of business.

We are looking for a fairly good export trade. This, however, depends very largely, we believe, on the developments of the peace conference as to what funds are made available for the reconstruction of France and Belgium, and whether or not arrangement will be made whereby the United States will largely finance this reconstruction work, the money thus advanced being expended largely in this country for machine tools and other supplies. If the latter arrangement is made on a liberal basis we can see no reason why business should not be exceptionally good in this country for some time to come.

Woodhouse Chain Works, Trenton, N. J.—Welded Chains.—We are anticipating a large demand for the first four to six months, 1919, domestically. There will undoubtedly be a larger export also of our line of goods. We do not anticipate being able to compete in the foreign fields against England and Belgium, unless there are restrictions put upon foreign trade, at the peace table, which we do not anticipate.

Veeder Mfg. Co., Hartford, Conn.—Tachometers, Tachodometers, Counters, Die Castings, etc.—Do not expect demand for our products for six months from Jan. 1, 1919, to exceed that of pre-war period, but do expect an increase after peace has been signed. Export trade looks more favorable and we anticipate increased trade, principally from the British Isles and continental Europe.

War's Various Effects on Foreign Trade

A Manufacturer of Machinery for Cutting Screw Threads—We anticipate a strong and growing demand for our product in the United States Jan. 1, 1919, and for six months from then, in fact, we see no reason why the demand should not continue. In fact, the demand shows a very vigorous start already. With respect to export trade, such large quantities of all kinds of machine tools have been exported during the past three or four years for manufacturing war munitions that will now be diverted to other lines of manufacture that it is yet too early to form a very concrete idea of just what the export demand may be for steel and metal-working tools and machinery. Of course, the same condition prevails in the United States, but not to the same extent that it does in European countries; however, indications look good to us for a very good export trade with nearly all of the European countries, especially so with France, Belgium, Italy, Spain and Portugal. Australia is also making rapid developments along all lines of manufacturing, and is sure to become a very good field for the products of the United States. South America also is sure to become a most promising market, but must be cultivated, manufacturing encouraged and its development assisted. We must take an active interest in the development of South American trade, must help to develop the natural resources of the country, not only by advice through correspondence and the newspapers, but through personal acquaintance and contact with the people, also through investment in their enterprises, otherwise we will never get very far toward a profitable trade relation with that country.

Standard Machinery Co., Auburn, R. I.—Presses, Drop Hammers, Rolling Mills, Rotary Swaging Machines, Wire-Drawing Machinery, Roller and Ball Bearings, Etc.—After the period of transition from war products to peace products is over we look for a good business. We are inclined to think, however, that the bulk of the business will come from our own country, and furthermore, that the demand for those products that have sold heavily for the past four years will drop down to a minimum, and that the demand for machinery and equipment of a different character will take place both in the domestic and export field.

Frost Mfg. Co., Kenosha, Wis.—Plumbers' Brass Goods—There is not a great deal we can say with reference to export, as heretofore we have not made any special effort to get any of this trade outside of Canada, but we feel that the opportunities at the present time in this respect are unlimited, and while we have not as yet mapped out any definite policy to pursue, we feel confident that with the proper method of procedure every manufacturer who wants any of this class of business can get as much as he may desire.

Morris Machine Tool Co., Cincinnati—Lathes and Radials—As to the demand for our product for January, 1919, considering the enormous amount of machine tools owned by the Government and their desire to dispose of them as soon as possible, the demand should be very light. In regard to the demand six months later, a number of the difficulties that are now staring us in the face should be overcome and from then on we should be entering into a normal time demand. This demand will pick up slowly and for the entire year 1919 we look for very little business. As to general export trade, the United States will no doubt receive a considerable proportion of it, but we do not look for the machine-tool demand that is talked about a great deal. In the last four years England has learned a great deal about manufacturing tools. She has developed this business, and will be in a better position to compete with us for European trade. There will be a fair demand for American machine tools as we have built up a reputation during the war and some manufacturers will want our product.

Brown & Sharpe Mfg. Co., Providence, R. I.—Machinery and Tools—As to the probable demands for our products after Jan. 1, this is so problematical and dependent upon so many elements that we are in no position to render a guess on this or on the probable foreign demand. As to the methods used for export trade, it will probably mean intensive salesmanship and also intensive designing with the purpose in mind of producing tools that are not only thoroughly well made, but that will reduce the costs of production.

Leeds & Northrup Co., Philadelphia, Pa.—Electrical Measuring Instruments—We believe the demand for precision, measuring and control apparatus, both in research and experimental laboratories and in industry, will increase in the United States. The necessity which many manufacturers have been under of meeting Government specifications has emphasized the advantage of precision control. The importance of research is being discussed and more widely understood and will have the same effect.

Pratt & Cady Co., Hartford, Conn.—Valves, Hydrants, Cocks and Steamtraps—We anticipate a steady and very considerable demand for our products in the United States for a period of two or three years. This demand, we believe, will start in shortly after the first of the coming year. Never in our minds has there been the possibilities in export business that there are at the present time. With the productive capacity of the principal foreign countries so badly disrupted and with the important need for extensive reconstruction, the foreign markets will look largely to the producers in this country to furnish their requirements. While it is a fact that in former times keen competition has of necessity forced the manufacturers here to make low prices for their goods, it would seem that under present conditions the price would not be the controlling factor, and many producers who have heretofore been shut out from getting into foreign trade because they could not compete on the price basis will now be in a position to export at a fair profit, get their lines introduced and very probably build up a business which will continue based on service rather than price.

The Question of Prices

Cincinnati Planer Co., Cincinnati—Planers and Boring Mills—As for the probable demand for our machines in the United States during the first six months of 1919, we would not be surprised if there was no demand whatever. There may be an occasional order placed, but they will be few and far between. As to the outlook for export trade, we believe there will be a splendid opportunity for marketing our machines in foreign countries just as soon as conditions are more

settled. Prices must come down, but before there can be any material reduction in the price of machine tools it will be necessary to have a reduction in wages and in the cost of materials. We are optimistic as to the future, but not the immediate future, and we believe it will be a good thing for the industry to slow down a little for a much needed rest and breathing spell.

Lovejoy Tool Co., Springfield, Vt.—Metal-Cutting Tools—With reference to markets, we are inclined to believe that it will be as good six months from Jan. 1, 1919, as it was six months ago. It is our belief that foreign markets for tools such as we manufacture will be rather small for some time to come, as England and France undoubtedly purchased very heavily for future needs and considerable caution will be used in placing further orders.

Dreses Machine Tool Co., Cincinnati—The demand for radial drills and turret lathes in the next six months will be very limited, and at the present prices the export will also be very light.

A Manufacturer of Lathes—A short time after the signing of the armistice there was a disposition on the part of some customers to cancel, and a few cancellations were actually received, probably in anticipation of a reduction in prices; with two exceptions every cancellation has been withdrawn, orders have been reinstated at the same prices as originally agreed upon, no concessions having been made and there appears to be a growing inquiry, but it is still too early to decide whether this is "shopping" or something more serious. We have had no word from any of our European agents recently to indicate that they wish to postpone the time of shipment of machines on orders for export, and in two cases there have been inquiries for delivery on additional equipment.

Davis-Bournonville Co., New York—Oxyacetylene Welding and Cutting Apparatus—Our product finds its market in practically all metal-working trades—in shipyards, locomotive and car shops, steel mills, foundries, etc. The demand has not appreciably lessened up to date, since the signing of the armistice, other than might reasonably be expected in the closing weeks of the year, judged by previous years. Our product is such that we anticipate a good and an increasing demand for it during the coming year. We also anticipate an increasing export trade, although this may not be expected to anywhere near reach the possibilities for increased domestic business.

E. Keeler Co., Williamsport, Pa.—Boilers—If prices reach an equilibrium we would anticipate no trouble in marketing our product. In common with almost every other industry, we do not anticipate a buying movement in our line until the public is satisfied that prices have become stable. Most of our foreign trade will be handled through the New York exporting houses, although we may establish two or three direct connections.

Heller Brothers Co., Newark, N. J.—Horse Rasps, Files.—We believe there is a big future in our industry for export business. The inquiries and demands are very heavy at this time, so that we do not intend to make any changes in prices, so long as the cost of labor continues at the present high prices, and labor cannot and should not be reduced while the high cost of living continues.

The Week's Market

New York

NEW YORK, Dec. 30.

Aside from a small amount of buying by the railroads and the Navy Department, the last week of the year has brought to the machine-tool trade the dullness which is usually expected at this season. Some sellers are doing practically nothing, while others, particularly the dealers, are doing what they consider a very fair business under existing conditions. One large dealer states that its December business will compare quite favorably with corresponding months before the war. Orders are for one to a half dozen tools.

The machine-tool trade has many prospects for business, but it is apparent that it will be some time, perhaps weeks or months, before these prospects will have been translated into actual inquiries. A development which is interesting a portion of the trade is the report that a number of plants in the East which have been almost exclusively engaged in war work will be converted to the manufacture of automobile parts, and some new equipment will doubtless be required for the readjustment. Some of the Bridgeport factories are reported to be considering new lines of manufacture, including automobile parts, but little definite information has yet become available.

The International Arms & Fuze Corporation, Bloomfield, N. J., has reinstated some of its canceled orders for tools and has given instructions that the tools be shipped to the American Machine & Foundry Co., Brooklyn, which is understood to be controlled by the same interests.

Crane business is exceedingly dull, the only projects before the trade being the requirements for the Mare Island Navy Yard, bids for which have been received, and those of the Pennsylvania Railroad. The latter is reported to have purchased two cranes, but other purchases will probably be deferred until after the first of the year. Locomotive crane builders have been getting a few orders from the railroads since the armistice was signed, but otherwise immediate prospects are few. A good export demand later on is expected, however. Prices of locomotive cranes have declined, the quotations for a 20-ton crane now being about $1,000 below the war prices.

The Englander Spring Bed Co., 88 Thirty-fifth Street, Brooklyn, manufacturer of iron spring beds, is having plans prepared for a two-story addition to its plant, 200 x 200 ft., at Stewart and Varick avenues. N. W. Lewis is general manager.

The Tes-Tite Piston Ring Co., 47 West Thirty-fourth Street, New York, is planning for the construction of a one-story addition, 50 x 100 ft., to its plant on Merrick Road, Freeport, L. I., to cost about $20,000.

The Lighthouse Department, United States Government, is planning for alterations and extensions in its machine shop at Tompkinsville, Staten Island, to cost about $45,000.

The Munson Mill Machinery Co., Utica, N. Y., has increased its capital from $25,000 to $50,000.

The Utica Automotive Corporation, Utica, has been incorporated with a capital of $10,000 to manufacture tractors, tractor parts, and similar products. F. E. Odell, N. C. Nelson and F. W. Dygert are the incorporators.

Fire Dec. 18 destroyed considerable machinery and equipment, including patterns and electric apparatus, at the plant of the Adams Laundry Machinery Co., Troy, N. Y.

The Alpha Portland Cement Co, Easton, Pa., has closed its plant at Martin's Creek, near Phillipsburg, N. J. About 300 men are affected. The company is planning to reopen the works in the spring.

The Hyatt Roller Bearing Co., Harrison, N. J., is working double shifts in its grinding and hardening departments. In the machine shop and other departments the men are working on a single day schedule.

A. C. Penn, Inc., 124-28 Adams Street, Newark, N. J., manufacturer of hardware, safety razors, etc., is planning to acquire additional property to increase its capacity.

Walter Scott & Co., South Avenue, Plainfield, N. J., are planning to resume operations at their works for the manufacture of printing presses. The company has been manufacturing gun carriages and proposes to convert the equipment used for this work for regular manufacture where possible.

The Overman Cushion Tire Co., 250 West Fifty-fourth Street, New York, has been incorporated under New Jersey laws with a capital of $150,000 to manufacture automobile tires and has awarded a contract to A. C. Windsor, 31 Randolph Street, Newark, for a one-story plant, 60 x 100 ft., on Rutgers Avenue, Belleville, N. J. M. C. Overman, Edward Nelson and Peter Swanson are the incorporators.

The Goodyear Tire & Rubber Co., 123 Washington Street, Newark, is considering the erection of a new six-story plant, about 100 x 250 ft.

Louis Sacks, operating a foundry on Wilson Avenue, Newark, for the production of gray iron castings, etc., has filed notice of organization of the Louis Sacks Iron Foundry, the Brass Founders' Supply Co., and the Star Heel Plate Co., to manufacture castings, foundry equipment, and steel heel plates. Louis Sacks, Inc., will be the parent organization.

The Submarine Boat Co., Newark, is planning to increase its force at its Port Newark works to about 18,000 employees. The company, it is understood, has work on hand to keep the plant operating at capacity until well into 1920. B. L. Worden is general manager.

The Essex Foundry, Murray Street and Avenue D, Newark, will erect a two-story brick addition, 72 x 180 ft., to cost $40,000.

Philadelphia

PHILADELPHIA, Dec. 30.

The Lowry Top & Body Co., Thirty-third and Walnut streets, Philadelphia, manufacturer of auto tops and bodies, has acquired about one-half of the building of the Hero Mfg. Co., at Gaul, Adams and Almond streets, with a total area of about 32,000 sq. ft., and is planning to use it for extensions.

The Navy Department, Washington, is planning for the construction of a new power plant at the League Island Navy Yard, Philadelphia, to cost about $35,000. A new bending shop will also be built to cost about $5,500.

The Belmont Iron Works, Philadelphia, has filed plans for a one-story addition, 35 x 63 ft., to the foundry of the Philadelphia Roll & Machinery Co., at Twenty-third and Carpenter streets.

The Weatherly Foundry & Machine Co., Weatherly, Pa., has acquired about 15 acres adjoining its plant for proposed extensions. It is planned to use a portion of the site immediately for the erection of new machine shops. The company recently entered into contract with the Lehigh Valley Railroad for repairing steel cars and the new shops will be equipped to handle this work.

The machine shop and boiler plant at the Pike mine of the Diamond Coal Co., Brownsville, Pa., was destroyed by fire, Dec. 20, with loss reported at $50,000.

Buffalo

BUFFALO, Dec. 30.

The Perfect Fuse Co., Buffalo, has increased its capital from $100,000 to $200,000.

The Automatic Registering Machine Co., 153-63 Jones and Gifford avenues, Jamestown, N. Y., is having plans prepared for the construction of a four-story building, 40 x 42 ft., and a two-story structure, 30 x 58 ft.

The Gurney Ball Bearing Co., Chandler Street, Jamestown, N. Y., has awarded a contract to the Jamestown Construction Co., 60 River Street, for a one-story addition, 25 x 170 ft., to cost $20,000.

The Ontario Equipment Corporation, Fulton, N. Y., has been incorporated with a capital of $10,000 to manufacture engines, boilers, and similar equipment. W. J. Hartnett, G. C. Hodgson and G. M. Fanning are the incorporators.

Fire, Dec. 19, destroyed the engine plant and part of the factory, including equipment, of E. Moreness & Co., Cleveland, N. Y., with a loss estimated at $15,000.

The Buffalo Bronze Die Cast Corporation, Buffalo, has increased its capital to $131,000.

The Sentinel Motor Corporation, Buffalo, has been incorporated with a capital of $50,000 to manufacture engines and similar machinery. F. C. Bonnet, H. R. Stratemeier and H. E. Witmer are the incorporators.

The S. A. Day Mfg Co., 1483 Niagara Street, Buffalo, manufacturer of buffing wheels and other platers' supplies, has increased its capital, from $10,000 to $25,000.

The Ontario Electric Steel Co., Fulton, N. Y., has been incorporated with a capital of $1,100,000 to manufacture high-grade steel. Carl Ehlermann, Jr., Donald R. Abbott and Frederick W. Jockel are the incorporators.

The Remington Arms Union Metallic Cartridge Co., 233 Broadway, New York, closed its works at Ilion, N. Y., Dec. 23, following orders from the War Department to discontinue the manufacture of Lee-Enfield rifles. It is understood that the company will resume operations early in January on the manufacture of sport guns and similar specialties.

Fire, Dec. 20, destroyed the power plant of the Ithaca Traction Co., Ithaca, N. Y., with loss estimated at about $75,000. It is understood that it will be immediately rebuilt.

Chicago

CHICAGO, Dec. 30.

The season is one in which inactivity is to be expected, and conditions are made more quiet by the fact that the period of readjustment from a war to a peace basis has just been fairly entered. No one doubts there are good times ahead; it is only in regard to how long it may be in coming that views differ. There are a few inquiries out, but no action is wanted on them by prospective purchasers until the inventories are taken. Some representatives of the machine-tool trade believe it will be February before the trade begins to take on a half-way normal aspect again, and some believe it will be longer.

All agree that orders will no longer fall in their laps and that they must work hard, as of old, to place a single machine. In fact it is a truth that it is more difficult to sell one machine than it is a lot of 10.

Nothing is reported yet as to what arrangement will be reached for the disposal of the huge quantity of machines which the Government has on hand or under contract. The trade will not feel at ease until this problem is worked out, and even then its worries may not be over.

So far as general business goes, it is admitted on every side that the crux of the present situation lies very largely in the labor situation. Existing wages for all kinds of labor are considered quite as much as material costs by those who would like to build a new plant, extend an existing one or otherwise increase their production. Nearly all theories as to how the situation may be bettered seem to center on the one thought that it will ensue only when the labor market becomes glutted and men are more agreeable to taking jobs with peace-time compensation. At the same time, the necessity for paying higher wage scales than existed before this country engaged in the war is admitted.

The Acme Boiler & Tank Co., 1017 West Forty-eighth Street, Chicago, is taking bids for the erection of a new one-story machine shop and general works building, 50 x 85 ft., to cost $15,000.

The Dispatch Motor Car Co., Fourteenth Avenue, Minneapolis, Minn., is considering the erection of two extensions to its automobile plant to cost about $100,000.

The Farm Traction Works, Guttenberg, Iowa, will build a new plant to cost about $15,000.

The Garden City Spring Works, 2300 Archer Avenue, Chicago, has had plans prepared for a one-story building to cost about $60,000.

The General American Tank & Car Co., Euclid Avenue, East Chicago, Ind., is considering the erection of a one-story addition.

The Locomotive Material Co., Atchinson, Kan., has awarded a contract to the Missouri Valley Bridge Co., Leavenworth, Kan., for the erection of a one-story machine shop, 80 x 150 ft., to cost $18,000.

Detroit

DETROIT, Dec. 30.

The Union Steam Pump Co., Battle Creek, Mich., has acquired more than 100 acres adjacent to the Grand Trunk shops. It is stated that the company will enlarge its manufacturing facilities and build condensers, duplex and simplex vertical pumps, centrifugal pumps and other marine machinery.

The Barker Tool, Die & Gage Co. has organized and will begin manufacturing at 515-517 Forest Avenue, East, Detroit. Frank V. Barker, John Barkowski, Frank L. Yogley, Pauline Yagley and Frank Gniech are the stockholders.

The Studebaker Corporation, Detroit and South Bend, Ind., announces that plans are being made for an annual output of between 150,000 and 160,000 automobiles. The banner year was 65,885 in 1916. No ordnance contracts have thus far been canceled and the order for 5000 chassis for the British Government will be completed.

The General Motors Co. is erecting a gray iron foundry at Saginaw and is remodeling the plant occupied by the Peninsular Shell Co. during the war, which will now be utilized for the manufacture of farm tractors.

The Liberty Starter Co., Detroit, will manufacture an electric starter for the 1919 Ford automobiles, which will be a part of its regular equipment. The Ford Motor Co. expects to build 1,000,000 cars in 1919.

The Standard Screw Products Co., Detroit, is expending about $150,000 in the purchase of special machinery for the manufacture of finished bolts of high tensile strength from forgings. The additional equipment and capacity is expected to be under way in March or early April. This new department will require considerable extension to the plant.

Cleveland

CLEVELAND, Dec. 30.

The market is dull. Very few inquiries developed the past week and these were practically all for single machines. The feeling is quite general, however, that business will open up in fairly good shape after inventories are taken.

One leading manufacturer of low priced automobiles placed an order the past week for eight large machines, amounting to about $35,000, and an order for nearly an equal amount of machinery is pending. A few single tool orders for turret lathes have also come from the automobile field. Dealers expect that within the next few weeks a fair volume of business will come from manufacturers of popular priced cars who are planning to increase their output. Some automobile manufacturers have asked that machinery houses protect them in prices until July 1. In reply to this request one leading dealer has expressed willingness to give a protection on prices until the machinery is shipped and billed, but not for a longer period. If a machine is delivered early in the spring and placed in operation, the seller sees no reason why he should protect the buyer against a price decline that might take place two months or more later.

The Champion Machine & Forging Co., Cleveland, which contemplated an extension to its plant several weeks ago when still engaged on Government work, announces that it will go ahead with this addition. It will purchase about half a dozen steam and drop hammers.

The Union Chain & Mfg. Co., Seville, Ohio, contemplates moving to a new plant in a larger town during the year. The company states that within the five years since its business was started it has outgrown three plants and now has outgrown the town in which it is located. If it is unable to secure a suitable plant, it will erect one and will spend about $100,000 for buildings and $50,000 for additional equipment. This company states that during the war 95 per cent of its orders for sprocket chains, sprockets, etc., came from companies having Government orders. It is now bringing out a new speed transformer and is making preparations to add other new specialties to its regular line.

The Tri-State Foundry & Machine Co., Wellsburgh, W. Va., will move to Warren, Ohio, where it plans to erect first a foundry and later a machine shop. A 5-acre site will be provided by the Warren Board of Trade. It is stated that M. G. Robinson and George Konold of the Warren Tool & Forge Co., will be interested in the company.

The Taylor Welder Co., Warren, Ohio, is bringing out an electric arc welding outfit using alternating current. It plans to extend its activities in the electric welding equipment field during the reconstruction period and to reach out for new and foreign business. During the war its efforts were devoted almost entirely to the production of electric welding equipment used in the manufacture of various kinds of war material.

The Borden Co., Warren, Ohio, increased its capacity 100 per cent during 1918 to take care of heavy requirements from the Government for large threading tools for use in France and expects that new demands in this country for pipe threading tools will be sufficiently heavy to keep its plant busy. The company reports it had a very satisfactory export business before the war which it now expects to continue.

The American Welding & Mfg. Co., Warren, Ohio, which established a plant the past year for the manufacture of motor truck wheel felloe bands, contemplates adding to its present products the manufacture of solid tire base bands, tractor wheel bands, steel rings and other steel products that can be manufactured by electric welding. Additional equipment will be installed.

The Thew Automatic Shovel Co., Lorain, Ohio, which has been operating from 60 to 80 per cent on Government work for several months, manufacturing special cranes, is returning to its regular line of manufacture. It states that in the past two years it has been developing its export business and will give more attention to the export trade than heretofore.

It is announced that the Youngstown Steel Car Co., Youngstown, Ohio, has had plans prepared for a new plant which will involve an expenditure of $2,000,000, and has acquired a 60-acre site in Niles, Ohio, near the plant of the Standard Boiler Co. William Wilkoff is president.

The Chevrolet Motor Co. announces that it will build an extension, 150 x 150 ft., to its Toledo, Ohio, plant in the near future. The company is controlled by the General Motors Corporation. The present plant in Toledo is used for the manufacture of transmissions for automobiles.

The Biggs Boiler Works Co., Akron, Ohio, is considering erecting an extension, and if its plans are carried out will require a 15-ton electric traveling crane and a hydraulic riveting machine.

Milwaukee

MILWAUKEE, Dec. 30.

The General Motors Corporation, Detroit and New York, which is completing the first unit of a new farm tractor manufacturing plant at Janesville, Wis., will begin work on the foundry or second unit immediately after Jan. 1, which will be of brick and steel, one story, 200 x 500 ft. Contracts probably will be awarded to the same concerns erecting the first unit.

A new gray iron and semi-steel foundry is being established at Hartford, Wis., by Robert LaPointe and Samuel B. Powers, who have leased the casting shop erected several months ago by Irving L. Bonniwell and will conduct the business under the name of the Hartford Foundry Co. Mr. LaPointe was formerly connected with large industrial foundries in Milwaukee as superintendent and works manager and later conducted a gray iron shop at Schleisingerville, Wis.

The Progressive Metal & Refining Co., 432 Barclay Street, Milwaukee, which sustained a loss of $25,000 by fire several weeks ago, has awarded contracts for repairs and extensions costing about $35,000. Some new equipment will be purchased. Max Sadek is president and manager.

The Van Brunt Mfg. Co., Horicon, Wis., manufacturer of drills, seeders and other agricultural implements, has tentative plans for the enlargement of its plant to provide facilities for the production of power farm machinery for tractor combinations. F. H. Clausen is vice-president and general manager.

The Philip Schwab Co., Milwaukee, operating a machine shop and heavy forge works at Sixteenth and Canal streets, will rebuild its plant, which was damaged $30,000 by fire Dec. 17. Plans are now in preparation and work will begin Jan. 10 or 15.

The Northern Gravel Co., Barton, Wis., will make improvements costing $15,000 in its sand and gravel plant. A new locomotive crane and conveying and hoisting equipment will be installed. Frank Wing is manager.

St. Louis

ST. LOUIS, Dec. 30.

The Laclede Iron Works, St. Louis, has been incorporated with a capital stock of $50,000 to manufacture steam steering gears and other mechanical devices and will erect a plant in the spring. The company has been in business for some time at 1315 Chestnut Street, where it dealt in machinery, engines and steel products.

Negotiations are under way for the purchase of the plant of the Whitman Agricultural Co., South St. Louis, by interests which will remodel it into one for the manufacture of steel. The identity of the purchaser is withheld for the present. The property contains 450,000 ft. of floor space and the deal is said to involve $350,000.

The Government's plan for increasing the facilities of the Western Cartridge Co. at Alton, Ill., and the housing project, on which it was expected $6,000,000 would be spent, has been dropped. The program called for $2,500,000 worth of machine tools and power equipment.

The Scullin Steel Co., St. Louis, has let a contract to the Fruin Colnon Construction Co. for an addition to its machine shops, 25 x 81 and 58 x 91 ft., at a cost of $12,000. All the equipment has been bought.

The American Car & Foundry Co., St. Louis, has leased a building covering a city block on Trudor Street to increase the facilities of its plant.

The American Furnace Co. has acquired a building at 2719-2721 Morgan Street, adjoining its plant, with the view of increasing its manufacturing facilities.

The Warren Steel Casting Co. will soon let a contract for building a new machine shop and will come into the market for electric motors and other equipment. M. B. Broad, assistant to the president, may be addressed.

Canada

TORONTO, Dec. 30.

The Imperial Munitions Board, Ottawa, Ont., expended about $1,100,000,000 during the war, 75 per cent of which was spent in Canada. The plants which it erected will probably be disposed of to private manufacturing concerns and adapted to peace industries. With the exception of selling these plants its work is practically finished

The Ker & Goodwin Co., Brantford, Ont., which started the erection of a munition factory a short time ago, for the manufacture of shells for the United States Government, has boarded up the building following the cancellation of the order. It is expected that work on the plant will be resumed in the spring, when it will be used for the manufacture of peace products.

Plate and Structural Mills at Fairfield, Ala.

(*Continued from page 49*)

various departments of the company as well as for the Chickasaw Shipbuilding Co. at Mobile. The gray iron foundry will constitute a large unit in the production of castings for this same work.

Sub-station No. 4 will serve all of the above shops. The current and air lines and hydraulic line will run from this station to the various shops.

Water will be secured from the Village Creek water works system and the main line will be tapped at a point close to the by-product coke oven plant. The soaking pit furnaces use by-product coke oven gas entirely as fuel.

Drinking water for the employees of the mill is furnished by a main connected to the Birmingham water works system, thus insuring good drinking water at all times. Every sanitary measure possible is being installed.

The incoming and outgoing freight will be handled by a direct connection with the main line of the Birmingham Southern Railroad running from Ensley to Bessemer.

The main trunk sewer for the new plant will be 7 ft. x 7 ft., and a novel combination has been arranged on the major portion of this sewer by making a double deck. The upper deck, 6 x 7 ft. in size, will be used for carrying the high tension electric cables to the various sub-stations, thus doing away with all poles in the plant.

Triplexing at Ensley

As the Ensley plant of the Tennessee company worked out some of the problems of duplexing, growing out of the shortage of scrap required for basic open-hearth practice, the same plant is now making an interesting departure in producing steel by triplexing. Following the blow in the Bessemer converter the metal goes to a primary open-hearth furnace in which refining proceeds for three to three and one-half hours, and then to a secondary open-hearth furnace in which the final refining requires about two hours, for the lower phosphorus steels of the company's product. There is considerable flexibility in the operations at Ensley. Wire steel furnished to the Fairfield rod mills of the American Steel & Wire Co. is one product, and for that, phosphorus elimination is not carried to the extent necessary for rail steel. At some Northern plants of the Steel Corporation, as is well known—those whose steel enters into wire, sheets and tin plates and in some cases pipe—ferrophosphorus additions are made in the open-hearth practice so that labor operations on the product may be facilitated, whether of wire drawing, separation of sheets in packs or the clean threading of the pipe. At Ensley, apart from the differing character of the product as determining steel works procedure—the steel going into rails, wire, plates, bars and shapes—an important factor is the production of slag phosphate, which the company undertook on a considerable scale three years ago. By triplexing the output of this fertilizer is much increased.

In Germany, where the greater part of the steel output is basic Bessemer, the pig iron runs about 2 per cent in phosphorus, whereas Alabama basic pig iron has a phosphorus content about 0.8 per cent.

Triplexing permits of a rapid production in the primary open-hearth furnace, of a high phosphorus slag, meeting market requirements of 18 to 22 per cent phosphoric acid, whereas in duplexing the operation in the single open-hearth furnace is governed so largely by the kind of steel aimed at that it cannot have the same regard to large and speedy slag production.

Recarburizing Metal for the Open Hearth

An interesting feature of open-hearth practice at Ensley in recent months has been the use of recarburizing metal in producing high carbon steels. At Bessemer, five miles further, the old Little Belle Furnace of the Tennessee company has been utilized to melt selected low phosphorus steel with suitable proportions of sandstone and dolomite, producing a metal of approximately the analysis of standard Bessemer pig iron. This molten metal is taken in ladle cars to the open-hearth department at Ensley. There it is held in a mixer from which withdrawals are made at intervals into a ladle whose contents are added to the steel in the 110-ton casting ladle on the open-hearth floor. The recarburizing metal, in addition to its carbon content, supplies a considerable portion of the manganese and silicon usually contributed by ferromanganese and ferrosilicon additions, and thus there is conservation of both these ferroalloys, with prevention of much of the heat loss that attends the additions of ferromanganese and ferrosilicon in the usual way. The necessity of the common employment of coke dust is also obviated.

Will Adjust Ordnance Contracts

A districts claims board has been organized in Philadelphia to adjust canceled ordnance contracts. John C. Jones, ordnance district chief, is chairman of the board. Other members are John Dickey, Jr., Major F. M. Masters, Major R. M. Appleby, Capt. Malcolm J. Ewen, I. H. Francis and Alexander H. Carver. When the armistice was signed on Nov. 11 there were approximately 1500 contracts for ordnance effective in the Philadelphia district. Of these about 750 have already been canceled, while a majority of those remaining in force have been suspended. Among the larger plants whose claims will be adjusted are the Midvale Steel & Ordnance Co., Bethlehem Steel Co., American Car & Foundry Co., Baldwin Locomotive Works and the J. G. Brill Co.

Mr. Jones, chairman of the board, is vice-president of the Harrison Safety Boiler Works. Mr. Dickey and Mr. Carver are lawyers. Major Masters is head of the inspection division of the ordnance district. Major Appleby is procurement officer of the district. Capt. Ewen is the district property and contracting officer, Mr. Francis is a consulting engineer. Mr. Carver will act as secretary of the board.

Dayton Manufacturers Organize

The Tool Manufacturers' Association of Dayton, Ohio, was incorporated Dec. 16, 1918, with a charter membership of 30 manufacturers. The following officers were elected: O. Garrison of the Garrison Machine Works, president; J. S. Kepler of the Automatic Machine Co., vice-president; E. F. Moore of the Moore-Eastwood Mfg. Co., treasurer; these officers, together with W. H. McBarron of McBarron-Mitchell Tool & Mfg. Co., and Lee A. Jones of the Vulcan Tool Co., constitute the board of trustees. Charles W. Saffell has been employed as secretary of the association and will maintain an office at 1200 U. S. Building.

The purpose of the association is the maintaining of the present high standard of efficiency which has been developed in the industry in this city and also by a series of educational propaganda to better inform the trade of the large resources which are available in the tool industry in Dayton.

The sintering plant of the Woodstock Iron & Steel Corporation, Anniston, Ala., was destroyed by fire, Dec. 17, with loss estimated at about $75,000. It is understood that the plant will be rebuilt.

Binding Contract for Iron and Steel Sales

Form Adopted by American Iron and Steel Institute Directors Provides Damages for Failure to Ship or to Specify—A Reform Long Agitated

On the report of the Committee on Contract Obligations, the directors of the American Iron & Steel Institute have approved a form of sales contract and recommended it to the trade for adoption and for use after Jan. 1, 1919. As already pointed out in these columns, the aim of this contract form, like that of the form adopted by the Association of Sheet and Tin Plate Manufacturers on Dec. 5, 1916, is to make transactions in iron and steel equally binding upon buyer and seller, to prevent the cancellations which in the past have disturbed the market, and to eliminate as far as possible overbuying and overselling. A number of changes have been made in the form of contract drafted by the same committee when the subject was under consideration several years ago. One of these is a change from 10 per cent to 5 per cent in the amount to be paid as liquidated damages by buyer or seller, in case the former fails to furnish specifications as provided in the contract or the seller fails to make shipments as agreed. The whole subject has long been under consideration in the trade, and among both producers and consumers the opinion has grown that in the interest of trade stabilization and of better commercial practice every effort should be made to give contracts binding effect.

Herewith is given a reproduction of the new contract, which is already in use by leading producers. The "Sales Contract" form occupies one side of the sheet and on the reverse side are printed the "Conditions of Sale."

_____ STEEL COMPANY

SALES CONTRACT

No._____ _____ 191____

_____ STEEL COMPANY hereby sells and agrees to deliver, and _____ hereby purchases and agrees to receive and pay for, the following material, at the prices and upon the terms herein specified, and subject to the conditions herein expressed; said material to be within the limits and of the sizes manufactured by the Seller and subject to the Seller's standard manufacturing variations, classifications and extras:

DESCRIPTION OF MATERIAL, QUANTITY QUALITY AND TIME OF ROLLING:

PRICES: _____ base, to which will be added the Seller's regular Extras, in accordance with list of Extras dated _____ attached hereto.

DELIVERY: The place of delivery under this contract is f.o.b. cars at the Seller's works, _____ for shipment to _____

The above prices include a freight allowance of _____ without discount, to be paid by the Buyer and deducted from face of invoice, except that no deductions for freight allowance shall be made on shipments of less than 300 pounds, nor in excess of actual weights. Prices do not include any allowance for Federal or other Taxes on freight payments.

TERMS OF PAYMENT: _____ Payment to be made in New York exchange or its equivalent. Freight charges to be paid in cash by the Buyer without discount. Federal or other taxes on freight payments to be paid by the Buyer

SPECIFICATIONS: Specifications for material to be furnished under this contract must be furnished by the Buyer beginning not later than _____, 191____, and ending not later than _____, 191____. Complete specifications for each month's shipment shall be furnished on or before the first (1st) day of the month preceding that in which shipment is to be made. The Seller shall not be obliged to accept specifications for soft or medium steel calling for less than _____ tons of any one size.

SPECIAL AGREEMENT: The Buyer's failure to furnish specifications as herein provided shall be deemed a refusal to accept the tonnage unspecified, which thereupon shall be deducted from the contract; and the Buyer shall pay to the Seller, as liquidated damages and not as a penalty, the difference between the contract price of such material for which the Buyer has failed to furnish specifications (less freight allowance, if any) and the market value thereof at the time of such failure; but such damages shall not be less than five per cent. (5%) of said contract price.

If the Buyer shall have furnished complete specifications as above provided and rollings are not made by the Seller as herein agreed, the tonnage which the Seller has failed to roll shall be deducted from the contract, and the Seller shall pay to the Buyer, as liquidated damages and not as a penalty, the difference between the contract price of such material which the Seller has failed to roll (less freight allowance, if any) and the market price thereof at the time of such failure; but such damages shall not be less than five per cent. (5%) of said contract price.

In all cases, the average prices, at the time of failure, as quoted in "The Iron Age" and "The Iron Trade Review," f.o.b. Pittsburgh, shall be the determining market price factor

SHIPMENTS: To be made promptly after rollings.

CONDITIONS OF SALE: This contract is subject to the Conditions of Sale printed on the reverse hereof

PLACE OF EXECUTION AND PERFORMANCE: This contract shall be considered as made and to be performed in the State of _____ and all questions that may arise in connection therewith shall be determined by the laws of said State.

This contract is not valid and binding upon _____ Steel Company unless signed on its behalf by its President, Vice-President or General Manager of Sales

Signed and delivered in duplicate.

_____ **STEEL COMPANY**

By _____

By _____

William C. Durant, president General Motors Co., Detroit, announces that the corporation is about to enter a new period of expansion which will affect all parts of this organization. It is expected that an important feature will be the development of tractor manufacturing to a much greater extent and that several of the tractor plants of the company will be enlarged.

The Weirton Steel Co., Weirton, W. Va., has opened offices at 208 S. Salle Street, Chicago. H. M. Easton will be in charge of sales of tin plate, and H. L. Gray in charge of sales of hot and cold rolled strip steel.

Training Course for Examiners

In Washington, beginning Jan. 6, the United States Employment Service of the Department of Labor opens a two weeks' normal training course for examiners. Upon the completion of the course, those who have acceptably passed through it will be sent out a trained and efficient staff to make standard the use of a common agency under the government, for labor distribution and placement.

Thirty employees of the Employment Service have been designated to take the first course, on completion of which they will be returned to their own states, so far as possible and there will train their own examiners for service.

Men from 15 states have been selected to attend the first conference and take the course, and, will generally be assigned to field work in pairs.

Nathan A. Smyth, Assistant Director General of the U. S. Employment Service, in commenting on this program, says:

"The training of our personnel is the most important thing we have before us. We have rendered effective service to the nation in assuring a sufficient working force to those industries engaged in vital war production. We are launched upon a vital program to replace in the industries of peace the millions of men and women who have served in the military and industrial armies of our country. And we are looking forward to the time when through a well established and efficiently coordinated chain of labor exchanges we can do much to eliminate unemployment and the retardation of production."

The intention of the Bethlehem Steel Co. to increase its holdings of ore lands in the vicinity of Lebanon, Pa., was disclosed last week at a hearing in the Lebanon County Court, when the presiding judge was asked to grant permission for the sale of the Margaret C. Freeman and Sarah H. Coleman estate holdings in the Cornwall iron ore banks. These holdings, totalling about 125 shares, have been held in trust since the early nineties. If the court grants permission for this sale other holdings of members of these families will, it is reported, also be disposed of when the opportunity is presented to the owner.

Will Not Build Ovens

Among extensions contemplated by the Carnegie Steel Co., Pittsburgh, to be made during 1919, was the erection of 260 by-product coke ovens in the Youngstown, Ohio, district. These ovens were to supply by-product coke for the six blast furnaces at the Ohio works at Youngstown, and several other blast furnaces owned by the Carnegie Steel Co. near Youngstown. However, this project has been called off, and the contemplated ovens will not be built during 1919 at least.

No. 2 blast furnace of the Republic Iron & Steel Co., at Haselton, Ohio, will be blown out, probably this month, for relining and general repairs. The furnace is now making about 400 tons of pig iron per day.

CONDITIONS OF SALE.

General. 1. If the Buyer fails to fulfil the terms of payment under this or other existing contracts between the Buyer and the Seller, the Seller may defer further shipments until such payments are made, or may, at its option, terminate this contract. The Seller reserves the right, even after partial shipments on account of this contract, to require from the Buyer satisfactory security for performance of the Buyer's obligations; and refusal to furnish such security will entitle the Seller to suspend shipments until such security is furnished or to terminate this contract. Termination of the contract under any of these conditions, shall not prejudice any claim for damages the Seller may be entitled to make.

Freight Rates. 2. In all quotations and sales which include a freight allowance, the price or prices quoted are based upon carload freight rates in effect at the date of the agreement, subject to prescribed lengths, minimum weights and minimum charges. In the event of an increase in such freight rates, the amount of such increase shall be added to the price of and to the freight allowance on all materials shipped under the increased rates; and in the event of a decrease in such freight rates, the amount of such decrease shall be deducted from the price of and from the freight allowance on all materials shipped under the decreased rates.

Sales F.O.B. Mill. 3. It is understood that f.o.b. Mill means delivered free on board railroad cars at the Seller's works.

Routing of Shipments. 4. The Seller is entitled to select the routing for all goods sold with freight allowance. On goods sold f.o.b. mill without freight allowance, the Buyer is entitled to select any routing officially authorized and published by transportation companies, provided he advises the Seller of such routing at the time of placing the order or specifications. The Seller reserves the right, however, to select the initial line, if inability to secure cars promptly or other reasons would involve delay in forwarding goods over the route selected by the Buyer

Delays in execution of orders or shipment of goods. 5-a. The Seller shall not be liable for failure to perform this contract in whole or in part, if such failure is the result of fires, strikes, differences with employees, casualties, delays in transportation, shortage of cars or other causes beyond the Seller's reasonable control; nor shall these exemptions be limited or waived by any other terms of this contract, whether printed or written; but in the event of unavoidable delay, due to any of the above mentioned causes, the Buyer may deduct from the contract such portion of the goods already specified as are not manufactured or in process of manufacture at the time his request to deduct reaches the Seller's works.

5-b. The Seller may ship any portion of the goods as soon as completed at the mill, and payment for that portion of the goods shipped shall become due in accordance with the terms of payment herein specified. Insistence upon suspension of manufacture or of any shipment, may be treated by the Seller as a wrongful termination of the contract on the part of the Buyer; and the Buyer shall thereupon be liable for all damages arising out of such termination.

Inspection. 6. Inspection and acceptance must be made at the manufacturer's works and shall be final. Reasonable facilities will be afforded inspectors representing the Buyer to inspect material and to apply, before shipment from the works, tests to which the Seller has previously agreed.

Guarantees. 7 The Seller agrees to replace steel proved to be defective in manufacture or unfit for the purpose for which it was sold, provided such steel is yet in the hands of the Buyer and the quality and purpose are stated in the contract; but the Seller will not pay any claims for labor on such steel nor for consequential damages. In all cases full opportunity shall be given for investigation by the Seller's representatives. Goods must not be returned except by written permission of the Seller

Shortages, Reclamations, etc. 8. The quantity of material shown by invoice shall in all cases govern settlements. Claims for errors, deficiencies, or imperfections will not be entertained by the Seller unless made with reasonable promptness after receipt of the goods.

Damage in Transit. 9. The Seller agrees that the goods shall be delivered to the transportation company in good condition; and the Buyer assumes all risks of rust, delay, loss or damage during transportation.

Agreements. 10. There are no understandings or agreements relative to this contract that are not fully expressed herein, and no changes shall be made in this contract unless reduced to writing and signed by both parties.

Current Metal Prices

On Small Lots, from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general headings of "Iron and Steel Markets" and "Metal Markets."

Iron and Soft Steel Bars and Shapes

Bars:	Per lb
Merchant iron, base price	4.77c
Refined iron, base price	6.27c
Burden's H. B. & S. bar iron, base price	6.40c
Burden's Best bar iron, base price	6.60c
Norway Bars, base price	20.00c
Soft Steel:	
¾ to 1⅞ in., round and square	4.17c
1 to 6 in. x ⅜ to 1 in	4.17c
1 to 6 in. x ¼ and 5/16	4.27c
Rods—⅝ and 11/16	4.27c
Bands—1½ to 6 x 3/16 to No. 8	4.77c
Shapes:	
Beams and channels—3 to 15 in	4.27c
Angles:	
3 in. x ¼ in. and larger	4.27c
3 in. x 3/16 and ⅛ in.	4.52c
1½ to 2½ in. x ⅛ in	4.32c
1½ to 2¾ in. x 3/16 in. and thicker	4.27c
1 to 1¼ in. x 3/16 in	4.32c
1 to 1¼ in. x ⅛ in	4.37c
⅞ x 1⅛ in	4.42c
¾ x ⅛ in	4.47c
⅝ x ⅛ in	5.27c
½ x 3/32 in	5.97c
Tees:	
1 x ⅛ in	4.67c
1¼ in. x 1¼ in. x 3/16 in	4.57c
1½ to 2½ x ¼ in	4.37c
1½ to 2½ x 3/16 in	4.37c
3 in. and larger	4.82c

Merchant Steel

	Per lb
Bessemer machinery	4.17c
Tire	4.17c
Toe calk	5.75c
Open-hearth spring steel	8.00c
Standard cast steel, base price	16.00c
Extra cast steel	18.00 to 20.00c
Special cast steel	23.00 to 25.00c

Tank Plates—Steel

¼ in and heavier 4.52c

Sheets

Blue Annealed

	Per lb
No. 8 and 3/16 in.	5.47c
No. 10	5.52c
No. 12	5.57c
No. 14	5.62c
No. 16	5.72c

Box Annealed—Black

	One pass, soft steel. per lb.	C. R. Wood's refined, per lb.
Nos. 18 to 20	6.32c	—
Nos. 22 and 24	6.37c	7.62c
No. 26	6.42c	7.67c
No. 27	6.47c	—
No. 28	6.52c	7.82c
No. 29	6.57c	—
No. 30	6.67c	—

Genuine Russia, as per assortment 22½ @ 25c

Patent planished, W. Dewees Wood, A 13 to 13¼c; B 11 to 11¾c net

Galvanized

	Per lb.
No. 14	6.87c
No. 16	7.02c
Nos. 18 and 20	7.17c
Nos. 22 and 24	7.32c
No. 26	7.47c
No. 27	7.62c
No. 28	7.77c
No. 30	8.27c

No. 28, 36 in. wide, 10c. higher.

Corrugated Roofing, Galvanized

2½ in. corrugations, 10c. per 100 lb. over flat sheets.

Tin Plates

Charcoal Plates

	Per box
AAA charcoal:	
IC 14 x 20	Nominal
IX 14 x 20	Nominal
A charcoal:	
IC 14 x 20	Nominal
IX 14 x 20	Nominal

Coke Plates—Bessemer

IC 14 x 20, 107 lb	Nominal
IX 14 x 20	Nominal

Terne Plates

IC 20 x 28 with an 8-lb. coating	Nominal
IX 20 x 28 with an 8-lb. coating	Nominal

Brass Tubes, Rods and Wire, and Copper Tubes

Manufacturers have withdrawn all quotations because of unsettled prices of raw materials and will only name prices to actual buyers.

Copper Sheets

Sheet copper, hot rolled, 16 oz., 38c. to 40c. per lb.
Cold rolled, 14 oz. and heavier, 1c. per lb. advance over hot rolled.
Polished, 20 in. wide and under, 1c. per sq. ft. extra over 20 in. wide, 2c. per sq. ft. extra.
Planished copper, 1c. per sq. ft. more than polished.
Tinning, one side, 6c. per sq. ft.

Copper Wire

Base price, at mill 38c

Tin

Straits pig	76⅛c
Bar	85c to 90c

Copper

Lake Ingot	27.30c
Electrolytic	27.30c
Casting	27.30c

Spelter and Sheet Zinc

Western spelter	10c. to 11c
Sheet zinc, No. 9 base, casks	17c; open 17½c

Lead and Solder*

American pig lead	7½c to 8c
Bar lead	8½c to 9½c
Solder ½ & ½ guaranteed	49c
No. 1 solder	44c
Refined solder	36c

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb	95c
Commercial grade, per lb	50c

Antimony

Asiatic 11c to 12c

Bismuth

Per lb $4.50 to $5.00

Aluminum

No. 1 aluminum (guaranteed over 99 per cent, pure), in ingots for remelting (carload lots), f.o.b. mill, per lb	32.10c
In small lots	40 to 45c

Old Metals

The market is sluggish and there is very little business. Dealers are paying nominally as follows:

	Cents Per lb
Copper, heavy and crucible	17.00
Copper, heavy and wire	15.50
Copper, light and bottoms	13.50
Brass, heavy	9.50
Brass, light	8.00
Heavy machine composition	16.00
No. 1 yellow rod brass turnings	9.50
No. 1 red brass or composition turnings	14.50
Lead, heavy	4.50
Lead, tea	3.50
Zinc	4.50